# INDIA RUBBER WORLD

OUR 65th YEAR

A BILL BROTHERS PUBLICATION

FEBRUARY, 1954

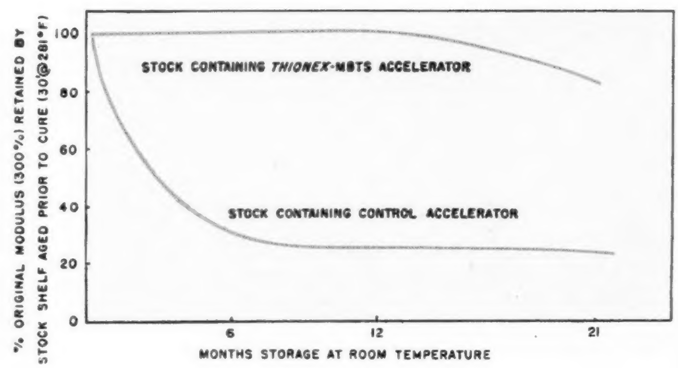
**LABORATORY AND FIELD TESTS PROVE . . .**

# DU PONT

# THIONEX®-MBTS

## ACCELERATION

## Provides Maximum Retention of Curing Strength During Shelf Aging of GR-S Camelback




Data for the graph above were obtained from laboratory tests in which 0.25 parts *Thionex* and 0.25 parts MBTS were used. These stocks were aged as long as 21 months. This graph shows that even after prolonged periods of storage, camelback stocks with Du Pont *Thionex*-MBTS acceleration will still produce treads which have the same outstanding qualities—excellent wear and resistance to tread cracking—as stocks processed immediately after compounding.

Remember these points when you buy accelerators for GR-S camelback stocks.

**DU PONT THIONEX-MBTS:**

- costs you less
- processes with safety
- retains its curing strength over long periods of storage
- imparts excellent physical properties to products

# DU PONT RUBBER CHEMICALS

DU PONT

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

*Ask your Du Pont technical sales representative for his help in solving your processing problems. He's part of a team of specialists that's hard to beat. Working with him on customer service is an experienced staff of rubber chemists and engineers . . . backed by Du Pont's outstanding research facilities.*

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# 25% FASTER CALENDERING

## of heavy vinyl sheeting with PLIOVIC

So reads the report on Textileather Corporation, manufacturers of Tolex a new "plastic leathercloth" especially designed for use in coats, jackets and sportswear—and of other high quality, fabric-backed, heavy-gauge vinyl sheeting.

Using PLIOVIC – Goodyear's easier processing polyvinyl chloride resin – Textileather found they could operate their calenders at speeds up to 25% higher than those possible with any other resin tried. And they had no problem with the streaking, roughening or loss of gloss usually encountered in the finished sheet at such speeds.

Two other advantages gained with PLIOVIC were the elimination of "fish-eyes"—hard agglomerates of unfused particles—in the sheet and the use of larger batches in the Banbury. All these added up to more throughput at lower cost, but at the same high level of quality.

Reason for this improved production with PLIOVIC is the fact that its polymerization is carefully controlled to give a particle size, shape and distribution, providing high bulk density and fast fluxing, combined with maximum physical properties.

PLIOVIC has proved itself in many plants. It can in yours. Just give it the chance. Get samples, the new technical manual and complete help, by writing to: Goodyear, Chemical Division, Akron 16, Ohio.

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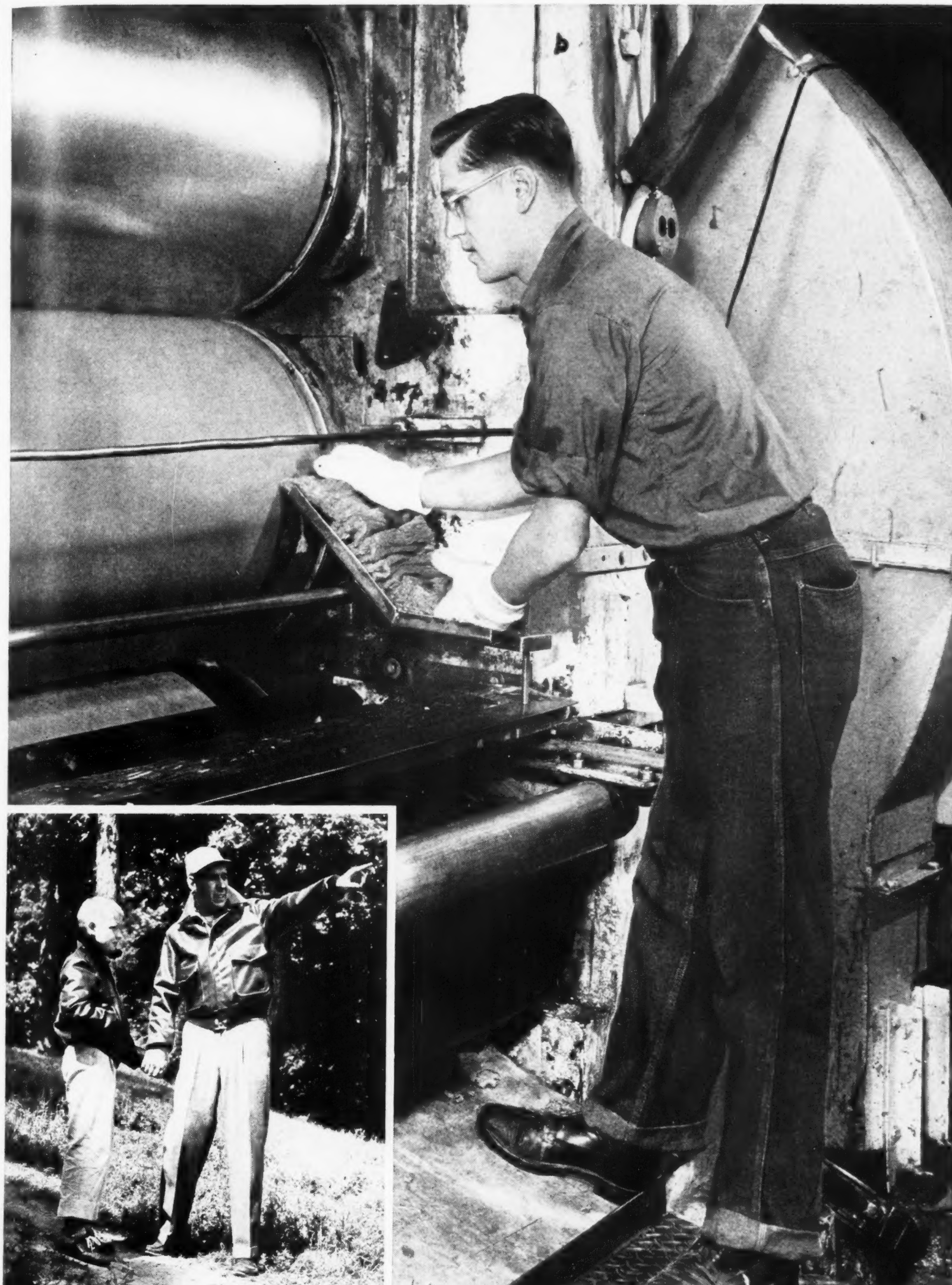
**Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry**



**TOLEX MAKES** these jackets soft, pliable, waterproof and highly resistant to scuffing or abrasion. PLIOVIC permits this fabric-reinforced sheeting to be calendered faster and at lower cost.

Tolex T. M. Textileather Corporation, Toledo, Ohio


# all dolled up with Titanox®

Cuddly dolls, the kind every little girl wants, are most warm and appealing when the rubber or plastic has the realistic coloration provided by TITANOX white pigments. Proper pigmentation adds tremendously to the sales appeal of any rubber product, from dolls to white wall tires.

TITANOX titanium dioxide pigments are compatible with all types of rubber and plastics. These strongest of white pigments add quality by imparting whiteness and maximum brightness and opacity to white or tinted products while maintaining natural strength and life.

Consult with our Technical Service Department for the solution to any rubber or plastic pigmentation problem you may have. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

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*the brightest name in pigments*

2239

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Subsidiary of NATIONAL LEAD COMPANY

MUEHLSTEIN • FIRST IN SCRAP RUBBER AND SCRAP PLASTICS

Skiing such as this is no sport for novices. It calls for long experience. In business, too, it's long experience that counts. That's why it pays to deal with Muehlstein . . . for over forty years—and still today—leaders in the supplying of raw materials to the rubber, plastic and allied industries.

**xperience counts**

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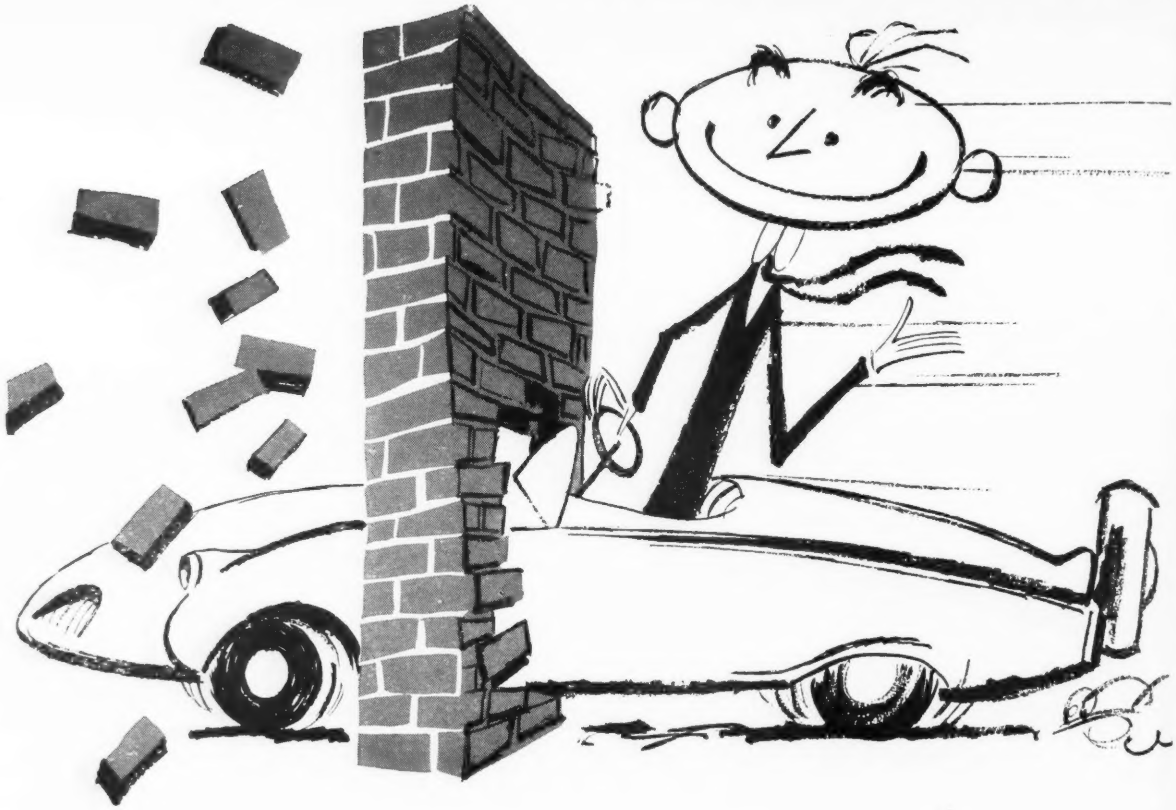

# How to get **Better Polyesters**

## at Low Cost

Can you mold a glass reinforced polyester that's strong enough to push over a brick wall and inexpensive enough to compete in the auto body market? Perhaps not today. But someday you may be called on to meet specifications almost that tough. And when you are, you'll probably be relying on a DIAMOND ALKALI Calcium Carbonate as a filler to help you get smoother surfaces, decreased shrinkage, improved wet strength and *lower cost.*

If you are not familiar with the DIAMOND's tailor-made precipitated calcium carbonates, here are brief descriptions:

Suspenso®—particle size about 5 microns.

Surfex®MM—Same as Suspenso, coated with 1% resin.

Multifex®MM—Uncoated, particle size about .06 microns.

Kalite®—Size about 1 micron, coated with 1% stearic acid.

For more information, specific formula suggestions and technical assistance, call your nearest DIAMOND Sales Office or write DIAMOND ALKALI Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.

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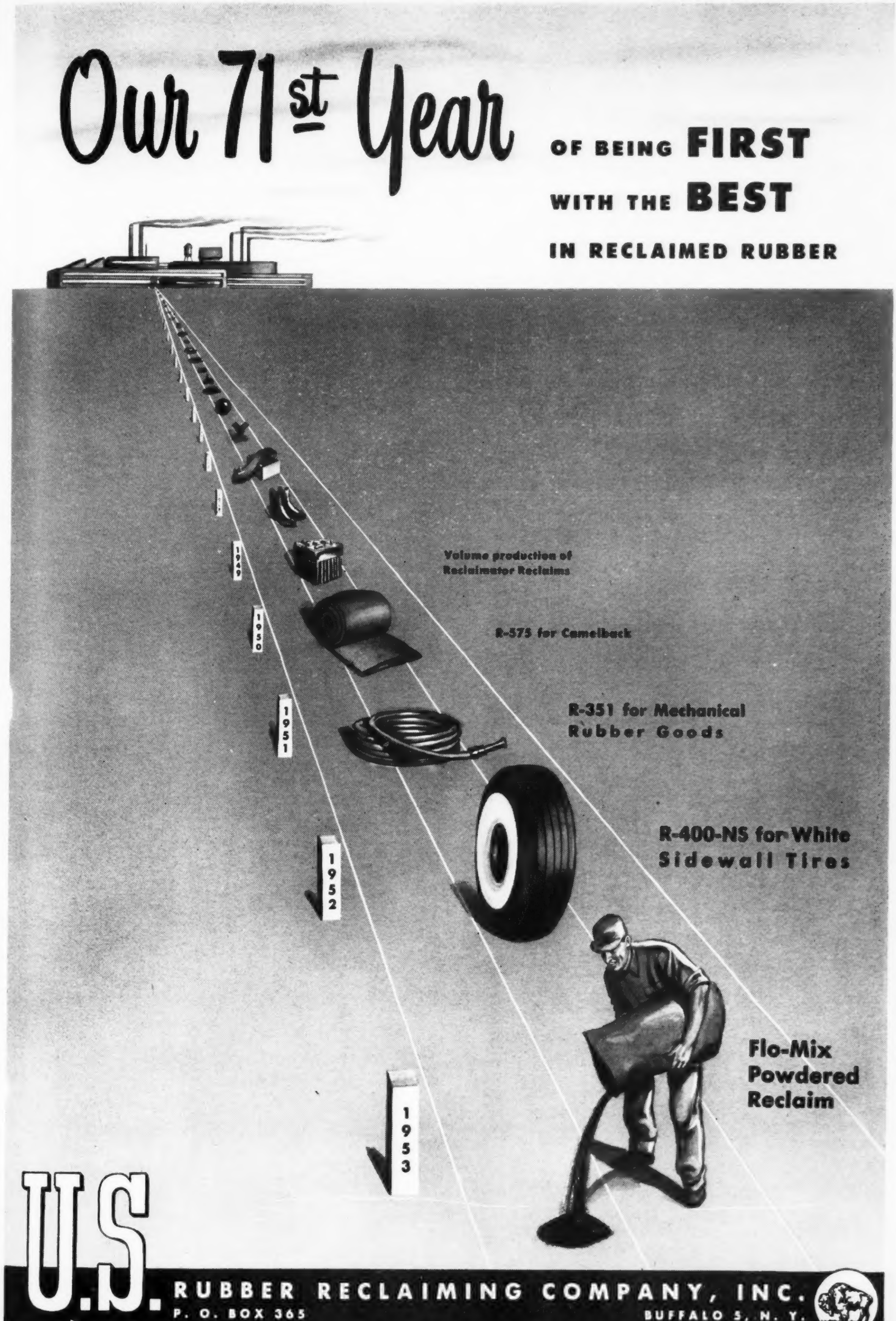
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1951
R-351 for Mechanical Rubber Goods
1952
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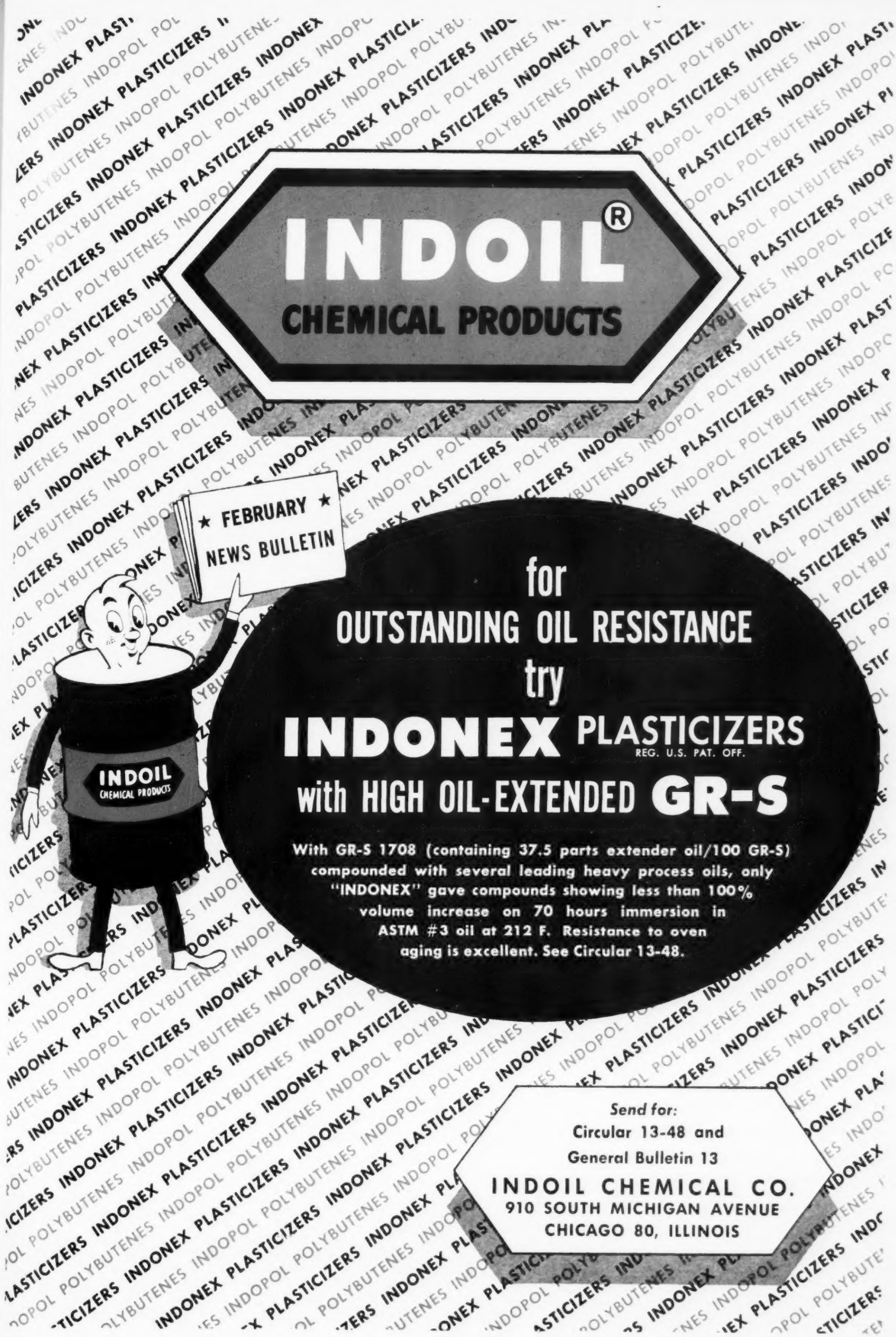
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with HIGH OIL-EXTENDED GR-S
With GR-S 1708 (containing 37.5 parts extender oil/100 GR-S) compounded with several leading heavy process oils, only "INDONEX" gave compounds showing less than 100% volume increase on 70 hours immersion in ASTM #3 oil at 212 F. Resistance to oven aging is excellent. See Circular 13-48.
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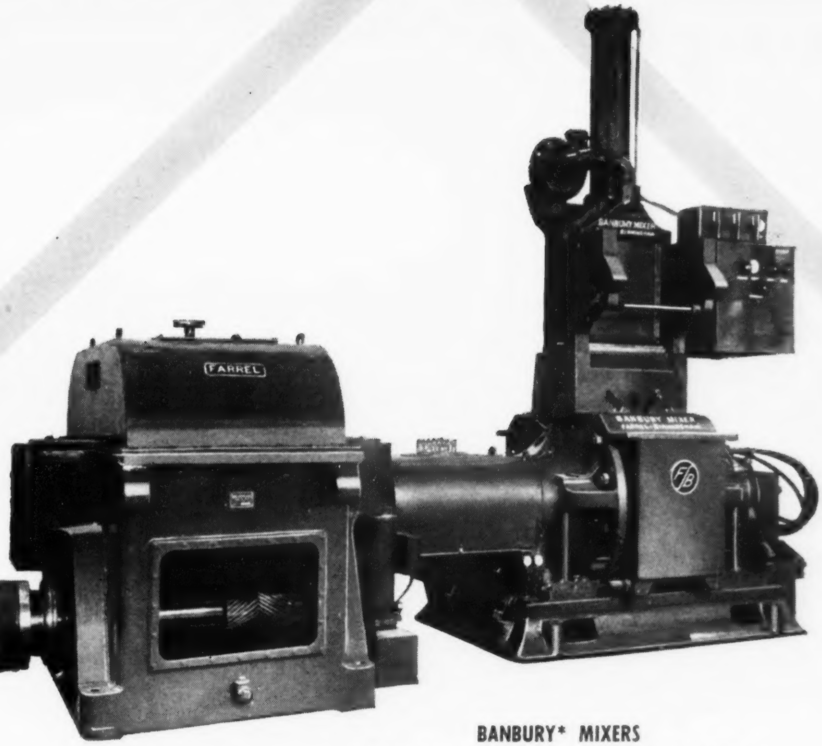
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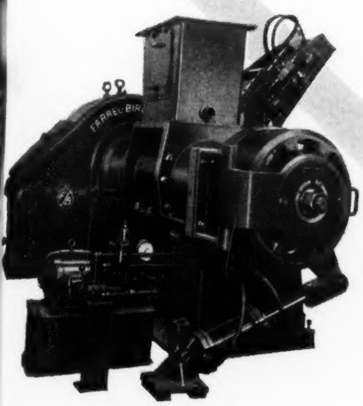
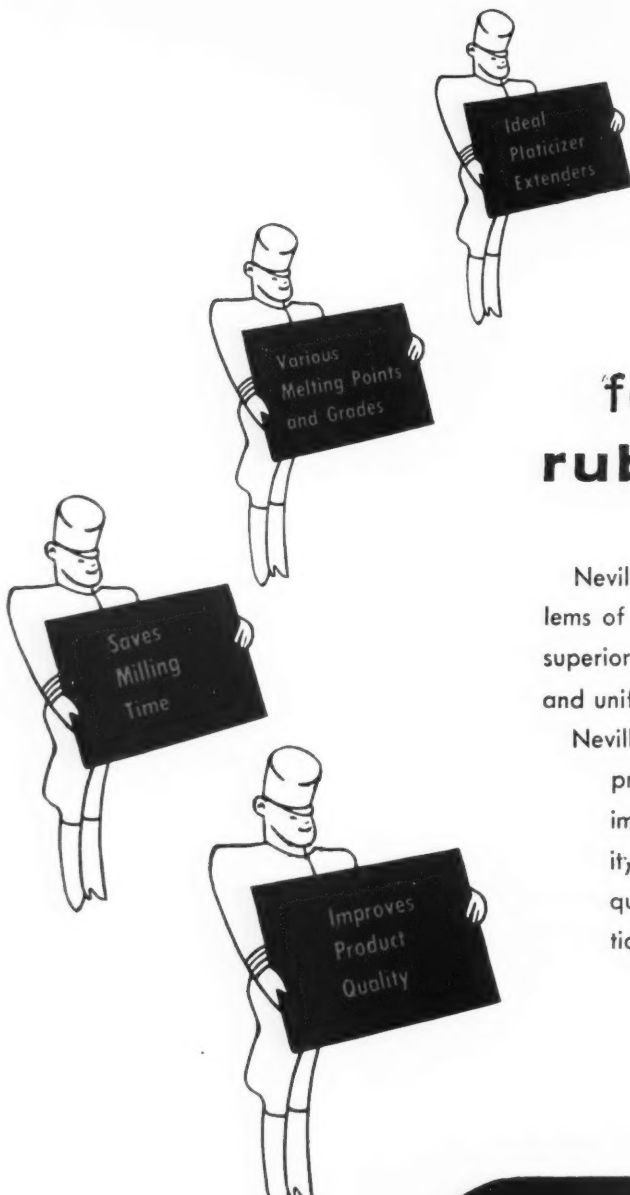


# Neville Chemicals




## for improving **rubber** products

Neville's years of experience with the problems of rubber manufacturers have produced a superior line of resins and oils for greater ease and uniformity in rubber processing.

Neville Coumarone Resins have long aided in processibility and pigment dispersion with improved physicals including heat stability, tensile and tear. They insure highest quality and maximum economy of production.

***Let us help you select the right grade for your purpose.***

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*Plants at Neville Island, Pa., and Anaheim, Cal.*

R-52

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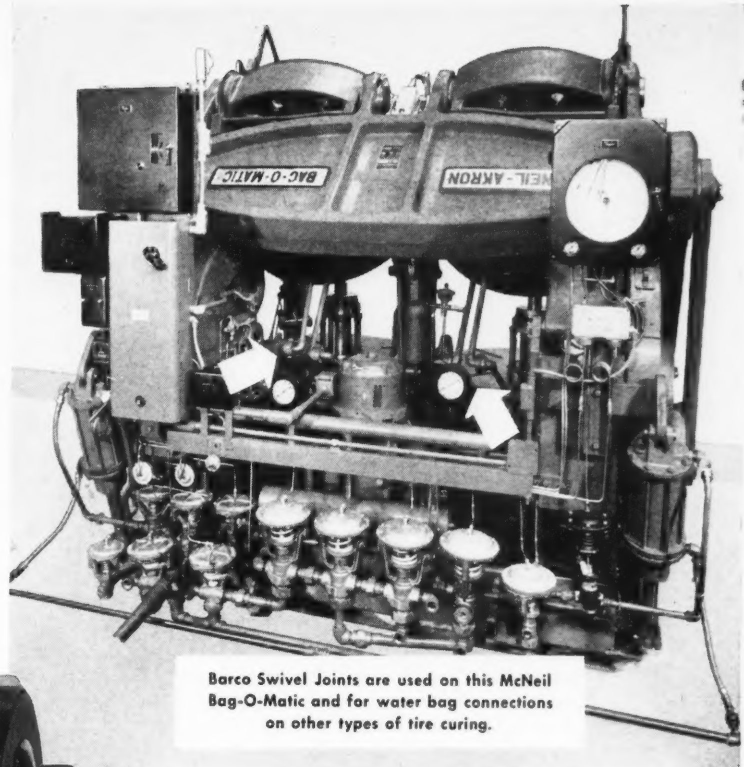


Barco Swivel Joints are used on this McNeil Bag-O-Matic and for water bag connections on other types of tire curing.


IT'S easy to get the right answer for even your most special steam, air, or hydraulic *piping jobs* when you use this new engineering catalog on BARCO SWIVEL JOINTS. It is complete with pictures and diagrams showing correct application and contains all specification data for *improved* Barco Swivel Joints:

- Leakproof! Perfect Sealing—Hot or Cold.
- No Binding, Low Torque! Trouble-free.
- Self-Aligning! Simplifies Installation.
- No Lubrication Required! Easy Maintenance.
- Economical! Wide Choice of Sizes and Styles.

**SEND FOR A COPY OF NEW CATALOG NO. 265A AND INSTALLATION DRAWING 10-52804.**

## IMPROVED BARCO *Swivel Joints*

## FOR TIRE MOLDS, PLATEN PRESSES

DEPENDABLE, TROUBLE-FREE PERFORMANCE—time after time—has been the one big reason for using Barco Swivel Joints in flexible piping connections and dog-legs on tire molds and platen presses used in the rubber industry. And now Barco offers even *better* performance and service, not only for new uses, but for thousands of existing installations.

The ANSWER is Barco's new, chemically inert No. 11 CT gasket. No other material is as amazingly long wearing and versatile. Even under most adverse conditions, joints maintain their seal, hot or cold, working or idle—with lower torque and no lubrication required. Natural operating action keeps the hemispherical ball of the joint lapped to a perfect fit.

Get this *advanced performance* in new Barco Swivel Joints! Send for complete information on MODERNIZING old joints!

**BARCO *Manufacturing Co.***

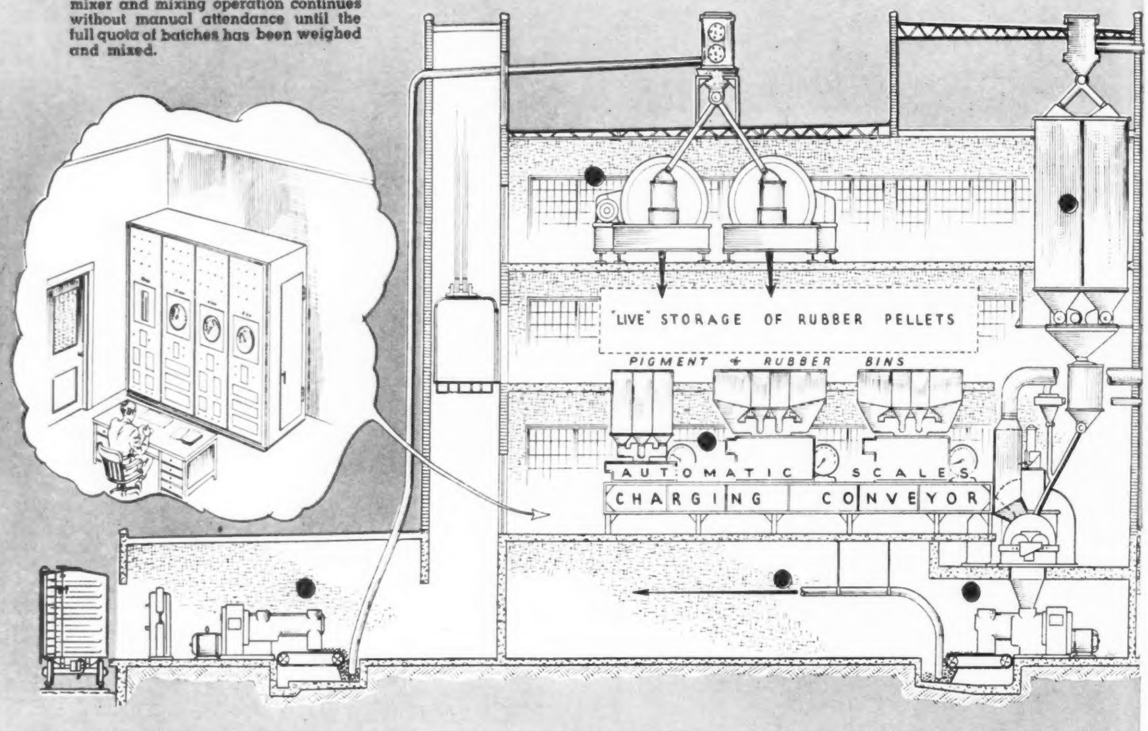
**510C Hough Street, Barrington, Illinois**
**In Canada: The Holden Co., Ltd.**
*The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Revolving Joints*

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

# *Automatic* mill room

**3** A recipe set on the control panel can be repeated 8, 10 or as many times as the schedule calls for. The weighing out, sequence delivery to internal mixer and mixing operation continues without manual attendance until the full quota of batches has been weighed and mixed.

**2** These blenders hold and blend as much as 20,000 pounds of rubber pellets. This results in a more thorough blend than is the case with large pieces from cut rubber bales.




**1** From the railroad car, the ingredients (rubber, reclaim, etc.) move through cutters and Plasticator-Pelletizers. The pellets are cooled, insulated from sticking together and blown to collectors on the roof over the compound rooms.

**4-8** The mixed stock moves through pelletizers, coolers and special storage facilities (reserved for various types of stocks), then into surge hoppers over an automatic mill of patented design, which will warm these stocks and feed them continuously into calenders or extruding machines.
Master batch stocks can be pelletized in same machine, returned to the compound room and stored in their respective bins over automatic scales.

## IS THIS FOR ME? WHAT ARE THE ADVANTAGES?

**Each succeeding batch or formula can be changed.**

New techniques in controls make the change setting of scales as simple as tuning in different stations on your radio. Now, the low volume producer with many kinds of stocks can consider automatic compounding and mixing.

**More pounds per hour through the mixing equipment.**

If you have a Banbury, the manufacturer has told you how to reduce mixing time. To increase the batches through your Banbury per hour, it is necessary to eliminate the human element which now throttles production.

Automatic scales weigh and deliver ingredients to the Mixer in a few seconds time. Hand scoops, carving knives and hand-set scales are ancient tools. Program controllers operate the Mixer. Pelletizers convert the mixed stock into pellets, which are cooled and blown into special bins. ALL LABOR has been eliminated!

**Extruding or Calendering on the "Heavy Side" No Longer Necessary.**

Hundreds of thousands of dollars worth of material can be saved yearly by extruding or calendering exact lineal weights. The intimate blending of the raw material and the precise weighing of all ingredients guarantees uniform gravities and physical properties.

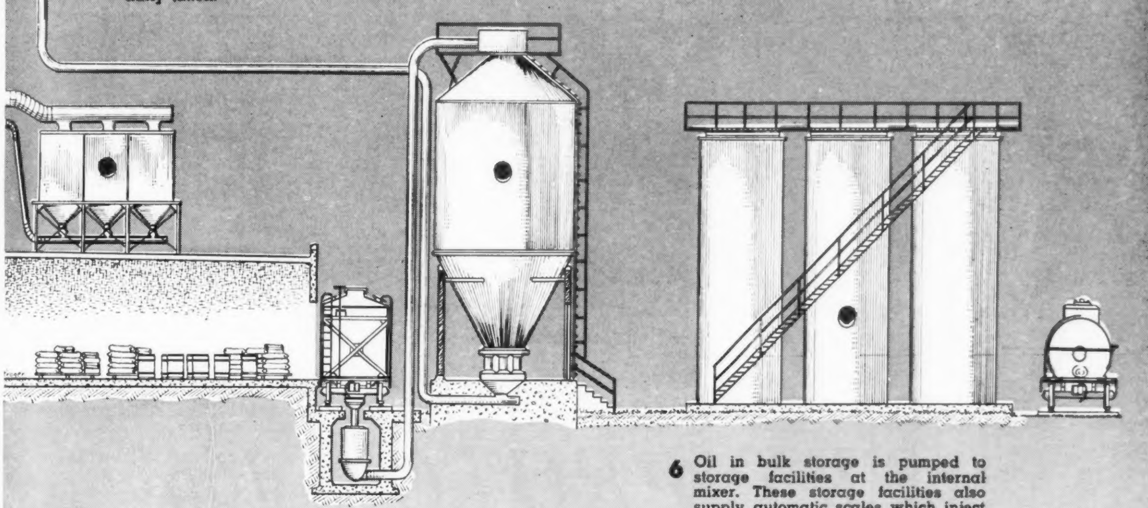
# Automatic Weighing and Handling of Raw Materials and Mixed Stock

## . . . from railway cars to calenders and extruders

**5** Carbon Black, in Bulk Form, moves directly from railroad car to storage bin. By automatic control, black is dispatched to any one of a number of surge hoppers over the mixers. These in turn feed automatic scales which discharge the correct weight at proper rate directly into mixing chambers.

**7** Dust from the mixing operation is collected continuously and returned to the Mixer for incorporation in the same batch from which it was originally taken.

In these two pages, we outline the specific advantages of an Automatic Mill Room. Hale and Kullgren is the first independent engineering firm to design such a plant. If you are interested in considering automation, Hale and Kullgren will survey your facilities and advise you on such factors as: savings; capital equipment needed; a recommended step-by-step program. Address your inquiry to: Hale and Kullgren, Inc., P. O. Box 1231, Akron, Ohio.



**6** Oil in bulk storage is pumped to storage facilities at the internal mixer. These storage facilities also supply automatic scales which inject proper amount of oil directly into the mixing chamber.

NE

*National Erie products for the Plastic and Rubber Industries • Extruders • Simplex Doors for Autoclaves • Mills and Hydraulic Presses.*

*This old and well-known line of machinery was acquired March 1, 1952, by The Aetna-Standard Engineering Company. They are manufactured in their Warren, Ohio and Ellwood City, Pa., plants. The sales and engineering of the National Erie line is the responsibility of Hale and Kullgren, Inc., Akron, Ohio.*

**COMPLETE SERVICE ON RUBBER & PLASTICS**
**a complete plant : a specialized process : an engineering service or individual machines**

SALES and ENGINEERING by

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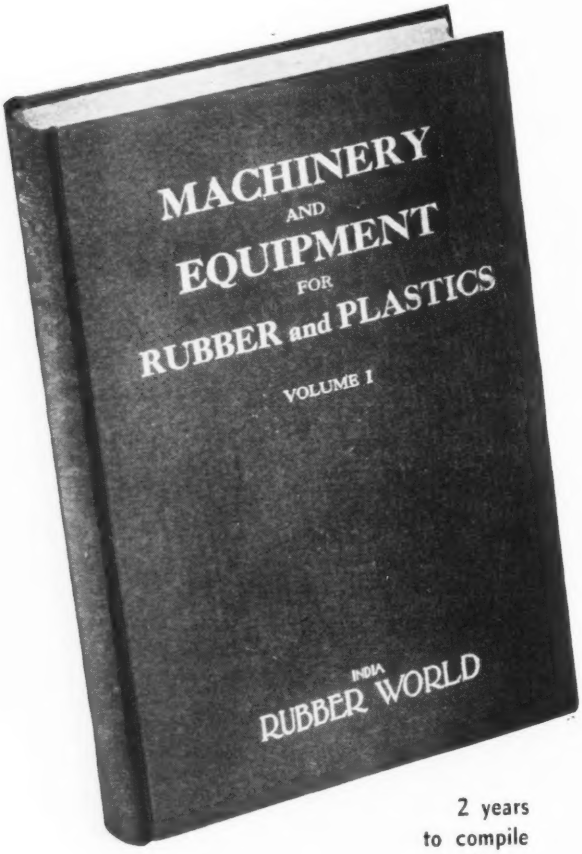
# The only book of




2 years
to compile
and edit —

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This time and money-saving book was compiled by Robert G. Seaman and Arthur M. Merrill, editors of India RUBBER WORLD, a publication with a background of 64 years of close contact with the men who have invented, improved, built, sold and used rubber machinery and equipment since 1889.

The urgent need and value of this 804 page book will be self-evident to all engineering, processing, purchasing and management personnel, especially to those men who have been confronted in the past with the problem of gathering this frequently needed and vital information from varied and widely-scattered sources.

Hundreds of orders have already been received from individuals, firms, libraries and schools — in U.S.A. and abroad. The edition being very limited prompt action is suggested. No reprint is anticipated.

# its kind • EDITION LIMITED

*Source, Construction and Use of*

"MACHINERY AND EQUIPMENT FOR RUBBER AND PLASTICS"

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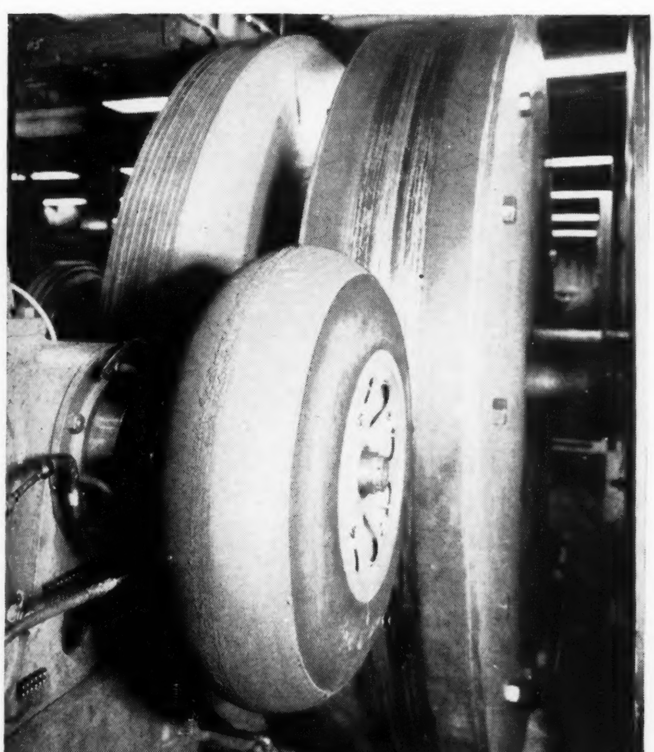
**... PRE-TESTED THE WORLD OVER ON ADAMSON UNITED AIRCRAFT BRAKE AND TIRE-TESTING MACHINES**



Striking examples of the versatility of Adamson engineering are the Brake and Tire-Testing Machines Adamson builds for the aircraft industry.

Simulating the landing of jet-propelled or other planes of practically any weight, at any given speed, they test the fitness of aircraft brakes and tires for use in actual service. A machine capable of testing the wheels and brakes of a 280-ton, jet-propelled job, landing at speeds above 250 miles an hour, is under construction.

Hydraulics, pneumatics, new and involved instrumentation and unusual control devices including radically new types of brakes for conducting fatigue tests on tires, and for regulating the speed of inertia wheels, are involved. Inertia wheels on some of the larger machines are 16 feet in diameter, weigh 185 tons, rotate at peripherial speeds of 200 miles an hour, and develop 212,000,000 foot-pounds of kinetic energy, yet are so accurately balanced that maximum machine vibration is held within .0005 and .001 of an inch.

As consultants to the U. S. Army Air Force, the U. S. Navy Air Force, the National Advisory Committee for Aeronautics, and to numerous aircraft manufacturers and brake equipment companies throughout the world, we have designed and/or built more machines of this type than all other manufacturers combined.

It may be that brake and tire-testing equipment will never be required in your operation, but keep in mind that Adamson's engineering abilities are available to design and build for you precision machinery not only for the aircraft industry or for the manufacture of rubber or plastics but for whatever may be your purpose.

We invite you to consult us on your next project. You will not be obligated.

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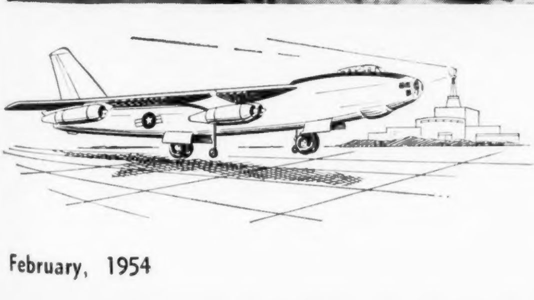
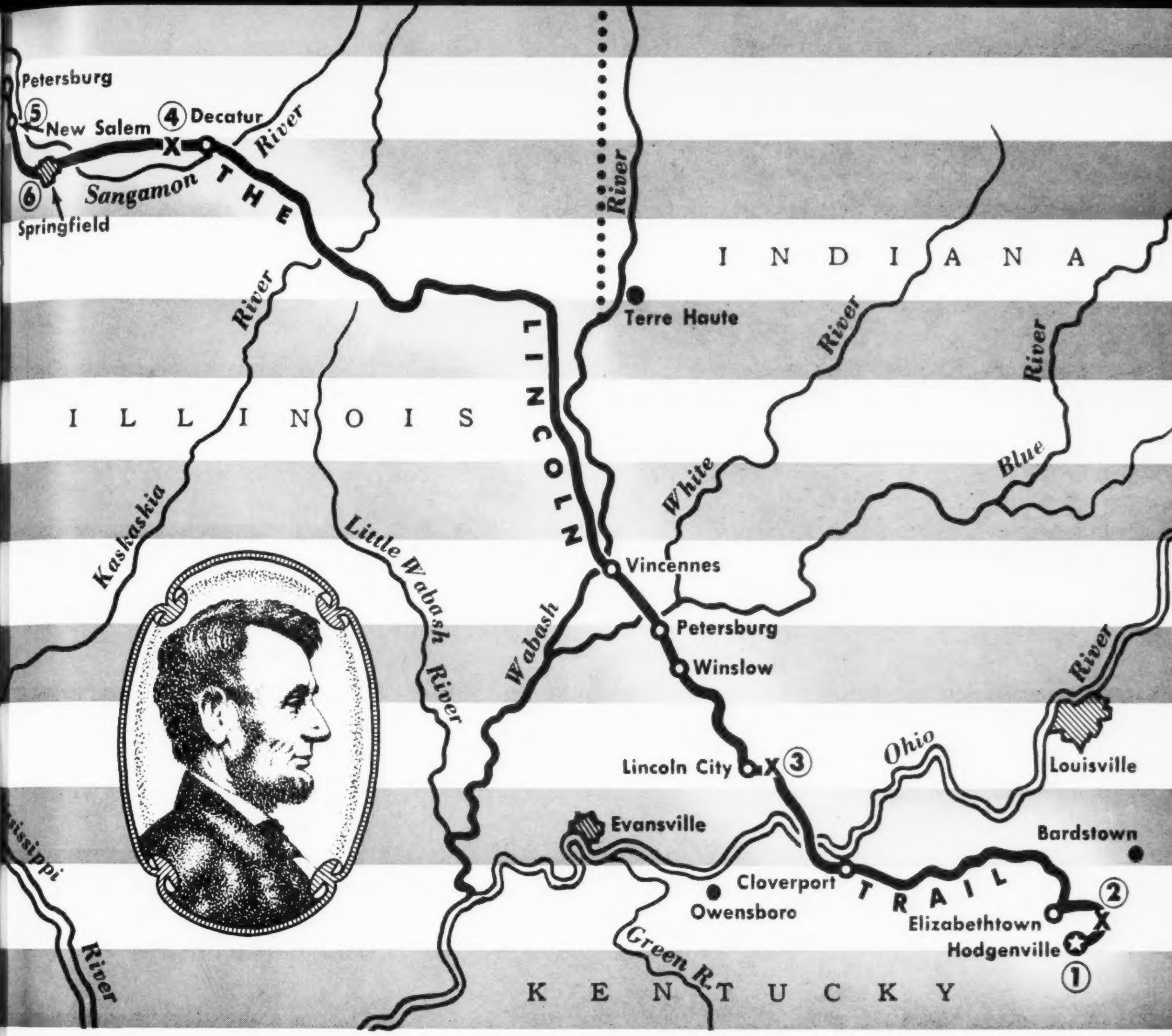


# Adamson United

AIRCRAFT BRAKE AND TIRE-TESTING MACHINES




*One in a Series of Famous Trails*

# The Lincoln Trail

This is the trail which led a boy, born February 12, 1809, from a small log cabin in Kentucky, to immortality. The numerals indicate: 1. Lincoln's birthplace. 2. His childhood home. 3. The Hoosier home of the Lincolns. 4. The first Illinois homesite. 5. Where Lincoln lived during his early Illinois years. 6. His final home and burial place at Springfield.

The first seven years of Abraham Lincoln's life were spent in Kentucky, the last five of these on a farm at Knob Creek. In the fall of 1816 the Lincolns moved to Indiana, where two years later Abe's mother, Nancy Hanks Lincoln, died. Young Abe lived a total of 14 years in the then Indiana wilderness, was 21, six feet four inches tall, when the Lincolns set out for Illinois.

Arriving at Decatur, young Abe helped his father build a cabin, then left home to make his own way. Following a flatboat trip to New Orleans, he settled in New Salem, moving to Springfield in 1837.

On leaving Springfield for Washington in 1861 to assume the highest office of his country, Lincoln said: "Here I have lived a quarter of a century . . . here my children have been born. I now leave, not knowing when or whether ever I may return. . . ."

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

**UNITED CARBON COMPANY, INC.**

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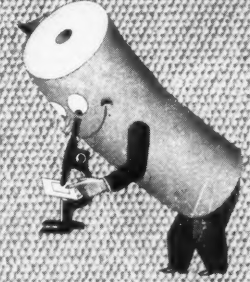
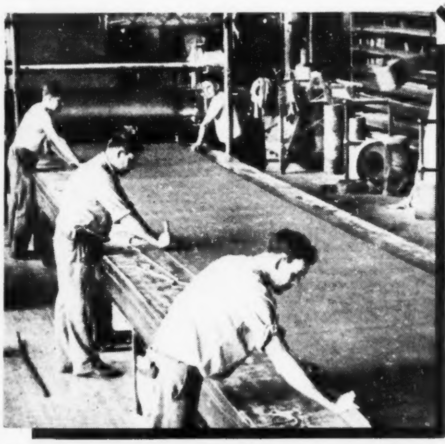
## Makes The Big Difference In

# INDUSTRIAL FABRICS



## MT. VERNON FABRICS GIVE YOU GREATER UNIFORMITY



One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here fabric thickness after weaving is being gauged.

**FABRICS ENGINEERED TO FIT YOUR NEEDS**

Need adaptation of an existing fabric to your special purposes? Or creation of an entirely NEW fabric — cotton, synthetic or blend — to meet your specifications? Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

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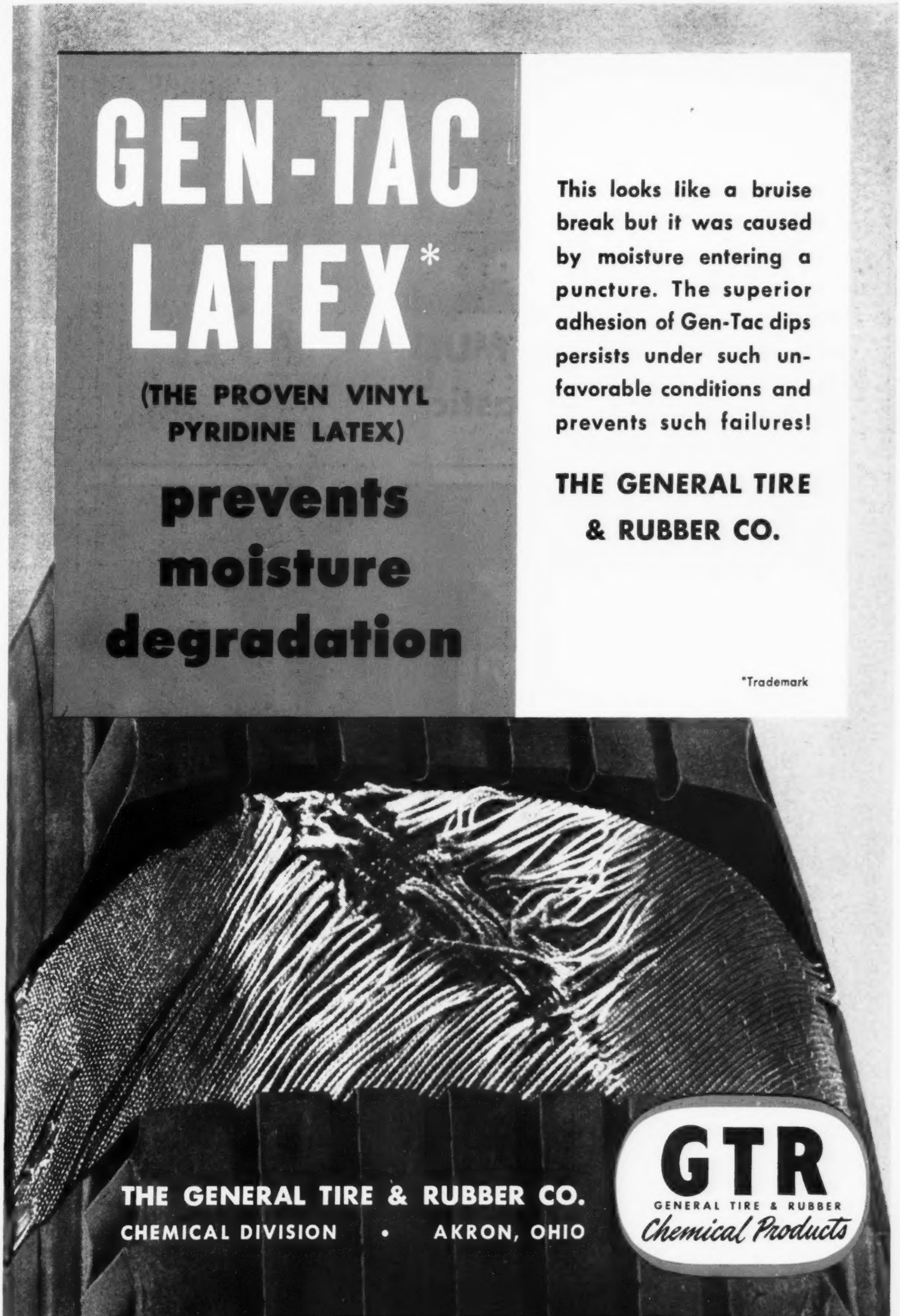
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prevents moisture degradation
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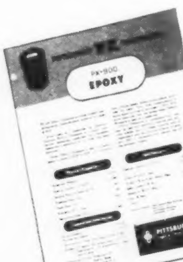


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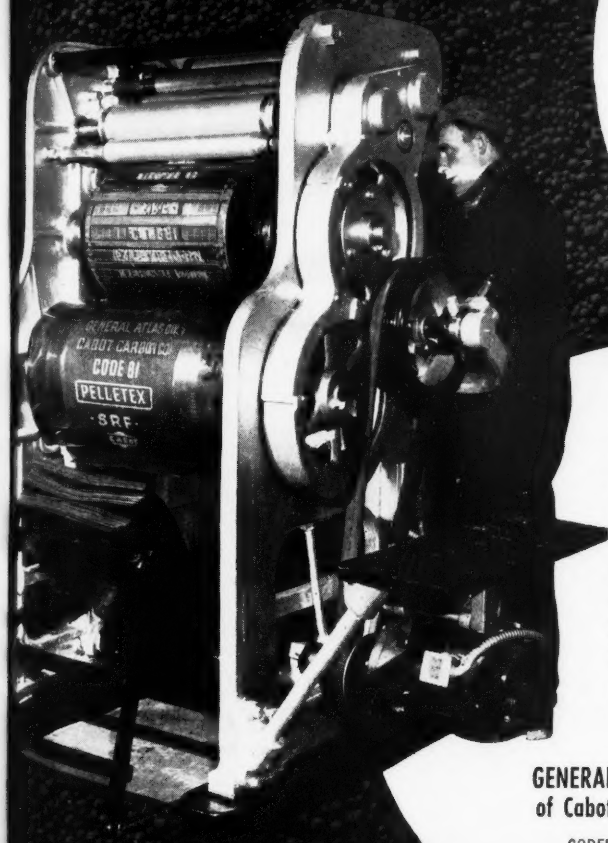


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# Long-Term Aging of Elastomers Under Continuous Shear Load[1]

G. L. Hall,[2] F. S. Conant,[2] and J. W. Liska[2]

THE serviceability of a continuously stressed, rubber-like material may be limited by either of two types of failure: excessive creep or rupture and loss of ability to perform the intended function of the material. In the following paragraphs a description is given of a method whereby tests for both of these vital properties are incorporated into a single procedure. First, however, let us consider briefly the nature of the continuous changes taking place in such a material.

Two kinds of creep are generally recognized: a primary or reversible creep and a secondary or irreversible creep. Primary creep is a viscoelastic deflection which is entirely physical in nature. It eventually reaches a limiting value which is dependent upon the highest conditioning temperature to which the sample is exposed. Primary creep has little, if any, effect on the functionality of a rubber-like material; nor does it, in general, lead to rupture.

Secondary creep is caused principally by the oxidative scission and cross-linking of chain molecules; but chemical reactions such as degradation, cyclization, and continued polymerization also may play a part. It is irreversible and may lead to rupture of a material under continuous load. The different types of chemical changes may be accelerated to different degrees by an increase in temperature.

Correlative effects of chemical changes are the changes in physical properties, of which the change in modulus is perhaps the most important. A decrease in modulus of a material under continuous load, such as a motor mounting, is accompanied by an excessive creep. An increase in modulus, however, may render the material useless for shock or vibration absorption and not show up as increased deflection. These considerations lead to the necessity of testing load-bearing elastomers for both creep and change in modulus under closely simulated service conditions.

A great many investigations have been reported on both the creep properties of high polymers (1, 2)[3] and on the effects of aging of rubbers (3). Most of the creep studies reported were made in the temperature range of viscoelastic behavior, with special precautions

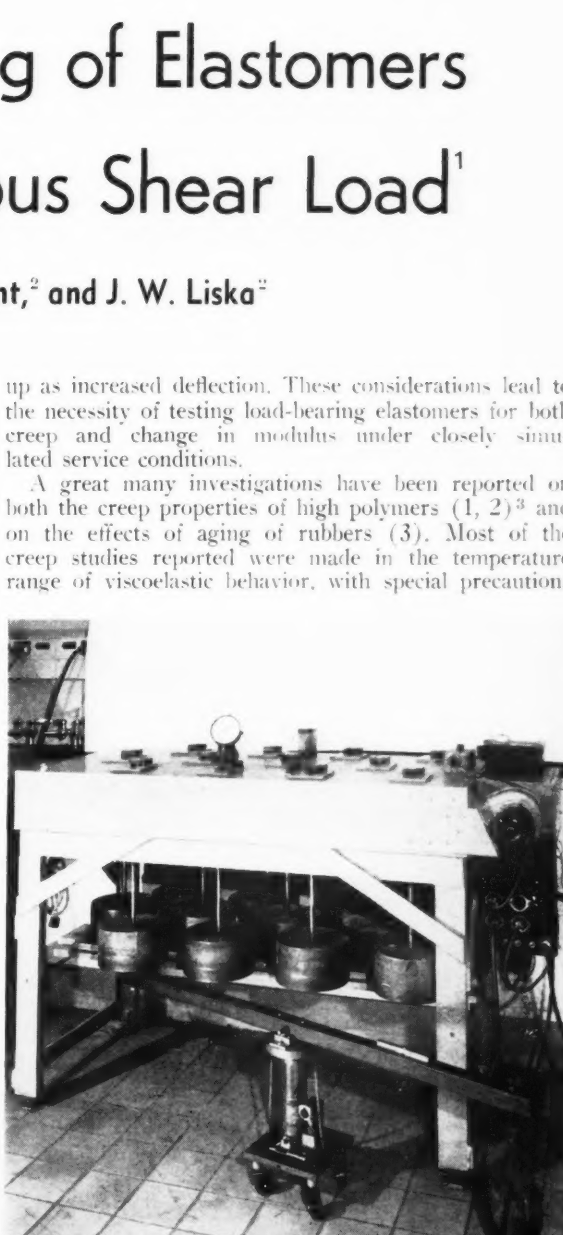


Fig. 1. Photograph of Shear Creep Apparatus

[1] Presented before the Division of Rubber Chemistry, American Chemical Society, at Buffalo, N. Y., Oct. 31, 1952.
[2] Chemical and physical research laboratory, The Firestone Tire & Rubber Co., Akron, O.
[3] Numbers in parentheses refer to Bibliography items at the end of this article.

being taken to avoid any chemical changes in the test materials. Accelerated aging tests are usually made with the test specimen in a relaxed state (4-6) instead of under stress, as they would normally be in service. The effect of aging is generally evaluated by measuring the change in some physical property such as tensile strength, tear resistance, or change in hardness. Measurements have been reported also on the aging of rubber-like materials in tension (7-12), in compression (13, 14), and in shear (15). A shear-type deflection was chosen for the present study since most rubber-like supporting units are normally stressed in shear in service. In the latter tests referred to above, measurements were usually made of physical changes such as creep, intermittent and continuous stress relaxation, retention of tensile strength, and degree of recovery. The relation of these properties to service requirements is not always clearly evident.

Most of the aging studies reported in the literature have been of short duration, with few of the tests extending over as much as one month's time. Most of the tests also have been made at relatively high temperatures (100 to 130° C.), where chemical changes take place at a rapid rate. Extrapolations from short-time, high-temperature tests to service conditions of long-time loading at comparatively low temperatures are probably unjustifiable, as has been pointed out repeatedly (3, 5, 15). Another criticism of many of the aging tests reported is the use of thin samples in which any surface chemical change (e.g., photo-activated effects) is relatively more important than it would be in service.

Hahn and Gazdik (15) used a test method similar to that in the present work. They made creep measurements in shear at 80 and 140° F. for periods up to 900 days. Although they showed measurements of both the extent of creep and the change in modulus, they did not stress the importance of the latter as a serviceability index. Their modulus measurements were obtained from stress-strain curves on the aged specimens. The secant modulus values thus obtained do not represent the properties of a stock, while under constant load, so well as do tangent modulus values such as those used in the present work.

## Test Specimen

The test specimen used was a double-sandwich shear type, previously used in short-time creep and recovery tests (16). The width of the rubber components in each half of the test specimen was 0.250-inch, and the thickness was 0.375-inch. The length was variable, although 3.75 inches was considered standard. End-effects were minimized by making the specimen long in comparison to its thickness.

## Description of Apparatus

Figure 1 shows one of the two 12-station shear creep apparatus used in the present work. The electrical controls and the temperature controlling unit are mounted on the extreme left of the apparatus. Dual motor blowers are mounted on the heating unit. These blowers circulate the hot air along the sides of the creep apparatus and draw it back through a center channel. One apparatus was designed to operate at 35° C., and the other at 70° C. The temperature at the different stations varied by not more than 1° C. in the 35° C. apparatus and by not more than 2° C. in the 70° C. apparatus.

In Figure 1 the weights are shown extending below the test chamber. The platens for positioning the dial gage extend above the test chamber. The dial gage is here tilted backward from its normally upright position in order to show the method of centering it on the platen. A principle of kinematic design (V-groove, flat surface, and spherical hole) was used to attain a uniquely defined position for the dial gage at each station.

Figure 2 is a schematic diagram showing the operation of this principle. It will be recognized as the method used in many analytical balances to position accurately the weight pans on the balance arms. Tests have shown that the unique position could be reproduced at any time and that the variations in dial readings encountered in successive replacements of the gage were less than the error in reading. This factor made possible the use of a single dial gage for both apparatus. A dial gage calibrated to 0.0001-inch was used.

The device used for quickly and accurately removing a part of the load, in the tangent modulus measurements, is shown in operation at one station in the foreground of Figure 1. Essentially this device is a beam, balanced on knife edges. One end of the beam is designed to fit into a depression under the center of the weight used to apply the load to the test specimen. The addition of a small weight to the opposite end of the equal arm beam reduces the load on the test specimen by the amount of the weight added.

## Test Method

In the standard creep measurements, a 60-pound (21.35 lbs./sq. in.) load was applied to the specimen, and its progressive deflection measured by reading the dial gage at appropriate intervals.

Modulus measurements were made periodically during the creep tests. These were "tangent modulus" measurements, based on the average deflection observed upon successively subtracting and adding 10 pounds (3.56 lb./in.$^2$) to the load already on the test specimen. Thus for the standard-length specimen the tangent modulus in psi. is given by:

$$\text{TM (psi.)} = \frac{\text{Load (psi.)}}{\dfrac{\text{Aver. deflection (in.)}}{\text{Sample thickness (in.)}}} = \frac{3.56}{\text{deflection}/0.25}$$

Deflection readings were taken 15 seconds after the 10-pound load was added or subtracted. At least 15 minutes were allowed to elapse between the two operations for the specimen to return to its state of near-equilibrium deflection. The continued creep of the test specimen did not appear to be disturbed by this procedure.

## Compound Formulations

TABLE 1. BASIC COMPOUND FORMULATIONS

| | *Hevea* | GR-S | Neoprene | Butyl Rubber | Butaprene | *Hevea* GR-S |
|---|---|---|---|---|---|---|
| *Hevea* rubber | 100 | | | | | 65 |
| GR-S | | 100 | | | | 35 |
| Neoprene GN | | | 100 | | | |
| GR-I (Butyl) | | | | 100 | | |
| Butaprene (medium acrylo. content) | | | | | 100 | |
| Sulfur | 3.0 | 2.0 | | 1.5 | 2.0 | 2.5 |
| EPC black | 15.0 | 20.0 | 20.0 | 30.0 | 45.0 | 20.0 |
| SRF black | 15.0 | 15.0 | 20.0 | | | |
| Benzothiazyl disulfide | 0.75 | | 1.0 | | 1.0 | |
| Stearic acid | 3.0 | | 0.5 | | 1.0 | |
| Zinc oxide | 5.0 | 5.0 | 5.0 | 4.0 | 5.0 | 5.0 |
| Med. proc. oil | 2.5 | | | | | |
| N-cyclohexyl-2-benzothiazole sulfenamide | | 1.25 | | | | 1.0 |
| Paraffin | | 5.0 | | 2.0 | | 3.0 |
| Turgum S* | | 8.0 | | | | 3.0 |
| Accelerator 308† | | 0.25 | | .. | | |
| Lt. cal. magnesia | | | 4.0 | 4.0 | | |
| Lt. process oil | | | 15.0 | | | |
| Vaseline | | | 2.0 | | | |
| Tetraethyl thiuram disulfide | | | | 1.0 | | |
| Mercaptobenzothiazole | | | | 1.0 | | |
| Dibutyl sebacate | | | | | 20.0 | |
| Age resister | | Variable | 2.0 | 0 | 2.0 | 1.3 |
| Cure @ 280° F. | 50′ | 60′ | 60′ | 60′ | 60′ | 50′ |

*Resin acid terpene blend.
†Condensation product of butyraldehyde and aniline (Du Pont).

The basic formulations for the compounds tested are shown in Table 1. The type and the amount of age resister were varied as shown in the test results below. Other physical properties on the basic compound formulations used have been previously reported (16, 17).

## Effect of Variation in Test Conditions

Reproducibility of results on duplicate test specimens was good. An example of typical creep curves is shown in Figure 3. These results were obtained on the *Hevea* compound containing one part PBNA (phenyl beta naphthylamine) tested at 70° C. The reproducibility, especially of curve shape, was considered sufficiently accurate to justify the elimination of duplicate testing.

The ordinate in Figure 3 and in the following creep curves is compliance, or reciprocal modulus (strain/-stress). This is a more intuitively satisfactory concept than is the change in secant modulus, since it is a quantity which increases with increased time under load. It is also a more fundamental and more readily usuable index than is the frequently used "% creep." For the standard-length specimen under standard load the compliance in in.²/lb. is given by:

$$C\ (\text{in.}^2/\text{lb.}) = \frac{\dfrac{\text{Total deflection (in.)}}{\text{Sample thickness (in.)}}}{\text{Load (psi.)}} = \frac{\text{Total deflection }/0.25}{21.35}$$

## Effect of Stress

The change in compliance with time under load was found to be relatively independent of the stress on the specimen. This point is illustrated by the data in Figure 4 for three different loads on the *Hevea* rubber compound (one part PBNA) tested at 35° C. This finding is in agreement with the results of Hahn and Gazdik (15).

## Effect of Sample Length

The change in compliance also appeared to be unaffected by changes in length of the test specimen, as is illustrated by the data in Figure 5. These data were obtained on the *Hevea* compound containing one part PBNA and tested at 35° C. The full-length specimen (3.75 inches) showed compliance almost identical to that of the ⅓ full-length specimen. That of the ⅔ full-length specimen was within the range of reproducibility of duplicate specimens. In the data shown elsewhere the full-length specimen was used exclusively, both because of ease of molding and to insure minimized end-effects.

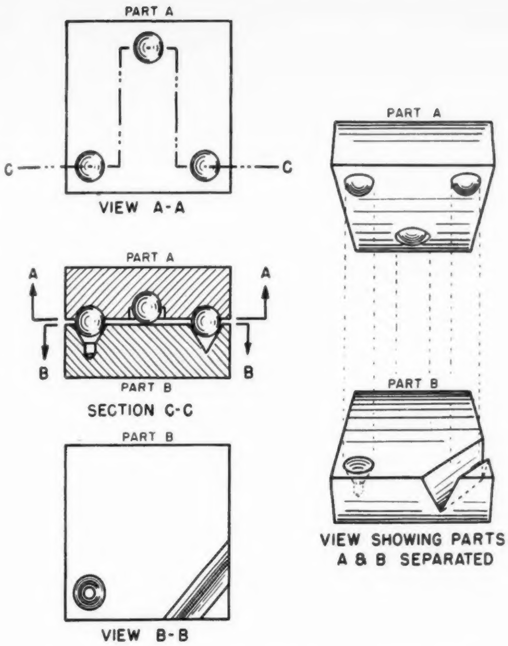



Fig. 2. Method of Positioning Dial Gage on Sample Holder

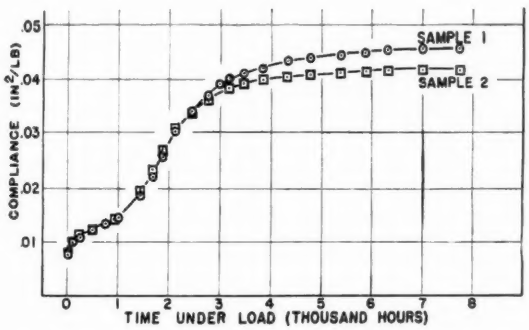



Fig. 3. Reproducibility of Creep at 70° C. *Hevea* (One Part Antioxidant B)

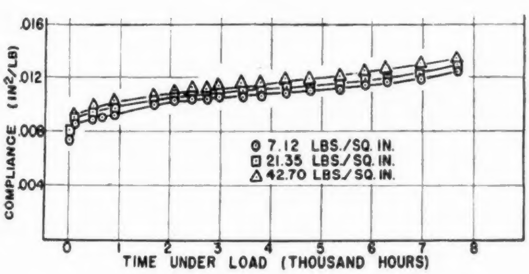



Fig. 4. Effect of Sample Stress on Creep at 35° C. *Hevea* (One Part Antioxidant B)

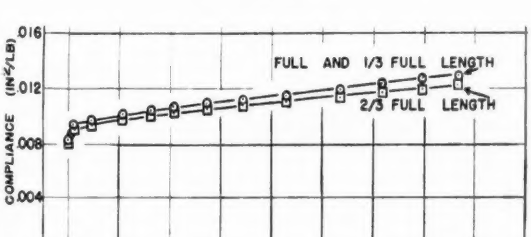



Fig. 5. Effect of Sample Length on Creep at 35° C. *Hevea* (One Part Antioxidant B)

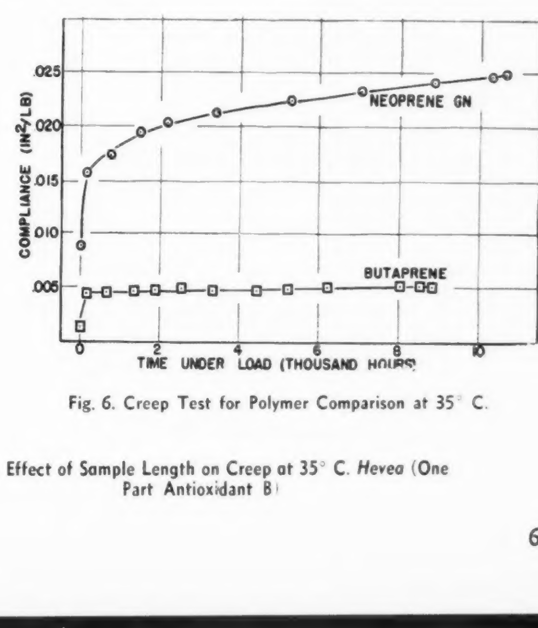



Fig. 6. Creep Test for Polymer Comparison at 35° C.

## Comparison of Polymers

The change in compliance with time under load of Butaprene and Neoprene GN vulcanizates tested at 35° C. is shown in Figure 6. The corresponding data at 70° C. plus that on the Butyl rubber compound is shown in Figure 7. The rate of change of compliance for the Butaprene compound was by far the lowest of the three. Also it was relatively unaffected by a change in test

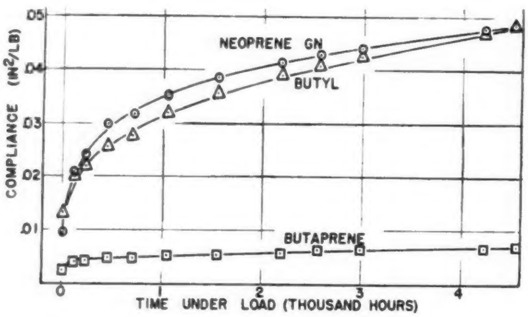



Fig. 7. Creep Test for Polymer Comparison at 70° C.

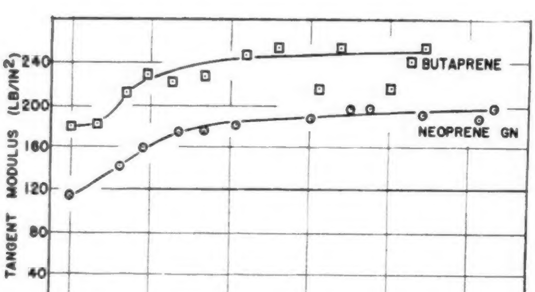



Fig. 8. Tangent Modulus Test for Polymer Comparison at 35° C.

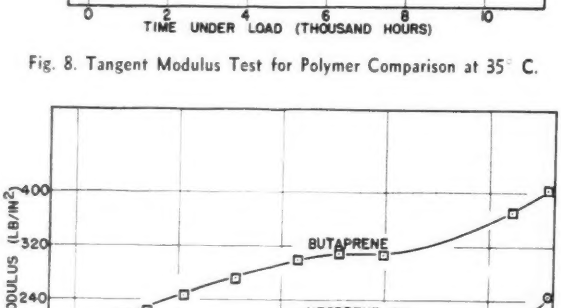
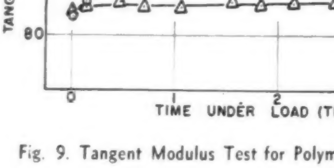



Fig. 9. Tangent Modulus Test for Polymer Comparison at 70° C.




*(Left)*
Fig. 10. Creep of Neoprene and Butyl Rubber Stocks

temperature from 35 to 70° C. It cannot be determined from these data alone whether the low creep rate of the Butaprene compound is due to a low rate of bond scission or to a high rate of cross-linking. Some aid in answering this question is given by the tangent modulus data in Figures 8 and 9, which were obtained at 35 and 70° C., respectively. These show a considerable increase in modulus for the Butaprene compound, especially at 70° C., indicating a comparatively large amount of heat stiffening. Thus the retardation of the creep rate was probably due to extensive cross-linking or continued polymerization rather than to the apparently excellent age resistance of the material. This illustrates clearly that a measurement such as tangent modulus in conjunction with the standard creep test is necessary to evaluate the serviceability of a compound after a given time under continuous load.

The rate of change of compliance with time under load for the neoprene and Butyl rubber compounds, when plotted on a semilogarithmic scale as in Figure 10, showed a sharp increase at about 90 hours at 70° C. and at about 2,000 hours at 35° C. This indicates the effect of temperature on the rate of chemical changes taking place in the test specimen. The Butyl rubber specimen in the 35° C. test failed after 4,200 hours because of poor adhesion. Incipient failure may have affected the latter results given on that sample.

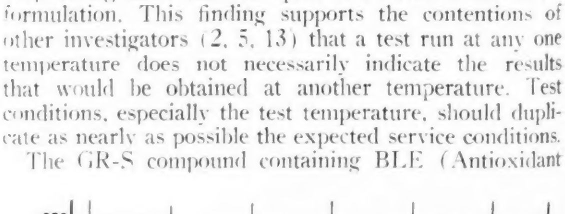
From the tangent modulus data at 70° C. (Figure 9) Butyl rubber appears to be excellent for use where it is important that the properties of the compound should not change while it is under load.

## Antioxidant Variation in GR-S

The effect of increasing the PBNA content in GR-S vulcanizates was less noticeable at 35° C. than at 70° C. Figures 11 and 12 show the compliance as a function of time under load at 35 and 70° C., respectively. The GR-S compound containing two parts PBNA (Antioxidant B) had a greater change of compliance at 70° C. than did that containing only one part PBNA, which would appear to indicate that the increased antioxidant actually allowed a greater chemical change to take place. A reference to the tangent modulus data in Figures 13 and 14, however, shows that the increase in antioxidant content was a slight deterrent to heat stiffening, at least at the 70° C. test temperature. The lower heat stiffening is reflected as a higher creep rate. Thus higher concentrations of this antioxidant appear to favor chain scission reaction rather than stiffening reactions such as cross-linking.

At 35° C. there appeared to be no advantage in incorporating more than one part of PBNA in the GR-S formulation. This finding supports the contentions of other investigators (2, 5, 13) that a test run at any one temperature does not necessarily indicate the results that would be obtained at another temperature. Test conditions, especially the test temperature, should duplicate as nearly as possible the expected service conditions.

The GR-S compound containing BLE (Antioxidant




*(Right)*
Fig. 11. Creep Test for Antioxidant Comparison in GR-S at 35° C.

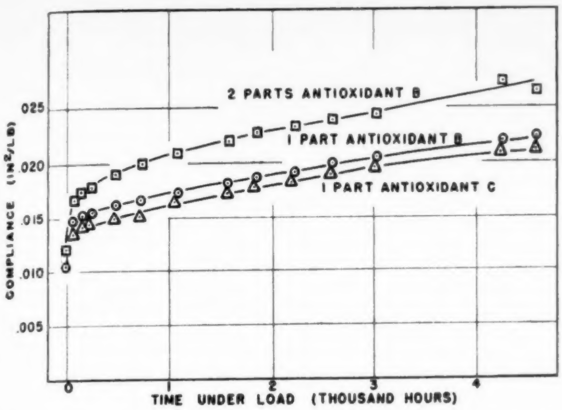



Fig. 12. Creep Test for Antioxidant Comparison in GR-S at 70° C.

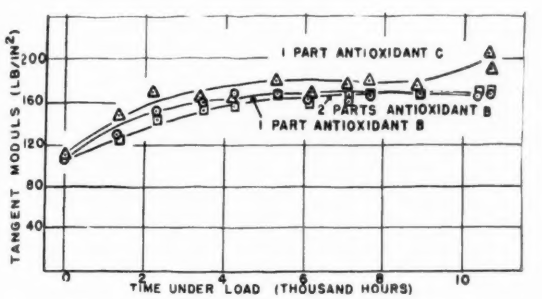



Fig. 13. Tangent Modulus Test for Antioxidant Comparison in GR-S at 35° C.

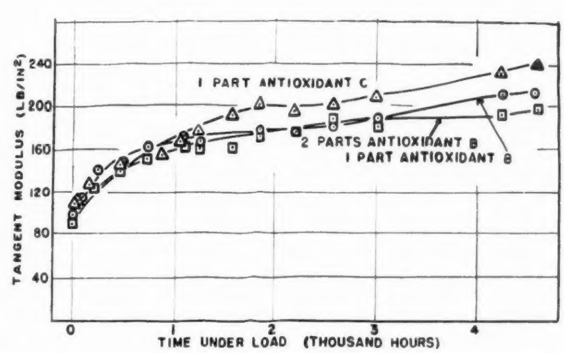



Fig. 14. Tangent Modulus Test for Antioxidant Comparison in GR-S at 70° C.

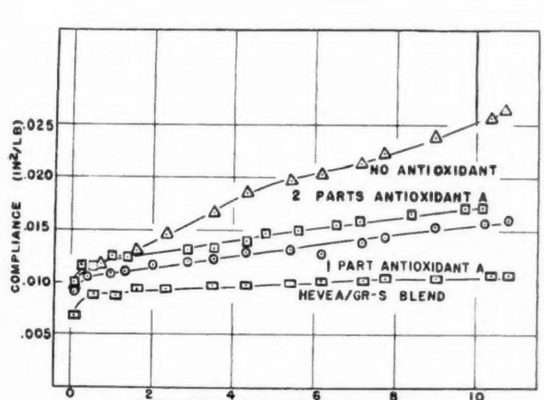



Fig. 15. Creep Test for Antioxidant Comparison in *Hevea* at 35° C.

C) showed a somewhat greater creep and greater change in modulus at 70° C. than did that containing an equal amount of PBNA. There was little, if any, difference between the action of the two antioxidants at 35° C.

All of the GR-S compounds in this series were from the same polymer batch. The antioxidants were added at the time of coagulation.

## Antioxidants in Hevea

No appreciable difference was found between the tangent modulus or compliance rate of the *Hevea* compound containing one part of Santoflex B (Antioxidant A) and that containing two parts of Santoflex B. This point was true for tests made at either 35 or 70° C. Figures 15 and 16 show the creep behavior at 35 and 70° C., respectively, and Figures 17 and 18 show the tangent modulus behavior of *Hevea* vulcanizates containing no antioxidant, one part Santoflex B, and two parts Santoflex B.

The most significant feature of the data in Figures 17 and 18 is possibly concerned with the shape of the curves. The aging of *Hevea*, in contrast to that of GR-S, produces first a stiffening, then a softening, and, finally, another stiffening of the test specimens. The final stiffening starts after about 1,800 hours at 70° C. in the compound containing no antioxidant. For the compound containing one part Santoflex B this point came at about 2,500 hours. For that containing two parts Santoflex B it was at about 3,000 hours. At 35° C. this cycle was very much delayed. The compound containing no antioxidant was still becoming softer after 10,000 hours under load. Those containing either one part or two parts of Santoflex B were apparently still in the initial period of increasing modulus after 10,000 hours under load.

Other results, for which data are not given, showed no significant difference in the aging characteristics among *Hevea* compounds containing one part each of Santoflex B, BLE, or PBNA. Variation in either type or amount of antioxidant in this study did not affect the creep rate or aged modulus to any great extent as compared to the variations among compounds based on different polymers. In this connection Throdahl (9) has reported that in accelerated aging under tensile stress, the accelerator appeared to be of greater importance than did the antioxidant.

In some unpublished work by I. B. Prettyman and G. L. Hall[4] on intermittent tensile stress relaxation at 120° C. it was shown that the softening action was predominant in *Hevea*, and a stiffening reaction was predominant in GR-S. Blends of *Hevea*/GR-S in different ratios showed that a 65/35 blend retained approximately a constant modulus throughout the aging period until it broke. A similar formulation was tested by the present

[4] The Firestone Tire & Rubber Co.

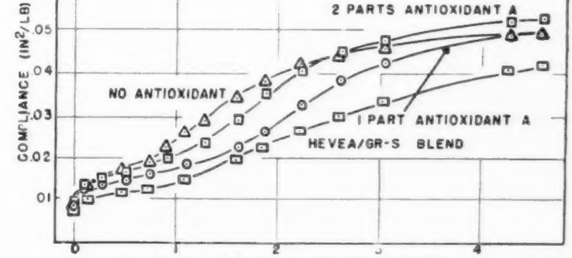



Fig. 16. Creep Test for Antioxidant Comparison in *Hevea* at 70° C.

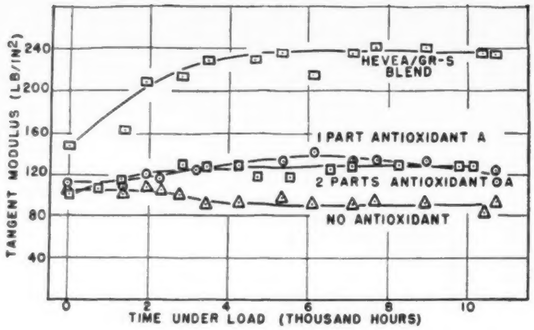



Fig. 17. Tangent Modulus Test for Antioxidant Comparison in *Hevea* at 35° C.

method under constant shear load. The results are shown in Figures 15 to 18 inclusive. At 35° C. the creep and tangent modulus of the blend followed those of the GR-S more closely than they did those of the *Hevea*. At 70° C. the behavior of the blend was more nearly like that of the *Hevea*. This fact might indicate that cross-linking is favored by a low-test temperature; while chain scission, however, is favored by the higher temperature.

## Conclusions

A satisfactory apparatus and method have been developed for testing the effect of long-time aging of elastomers under load. This method includes a measure of the change in modulus as well as the total amount of creep, and the importance of evaluating both quantities was demonstrated. It is believed that the method more closely approximates service conditions than do most aging tests that have been reported.

Antioxidants appeared to be somewhat more effective in GR-S than in *Hevea*. No one type of antioxidant was found to be outstandingly effective in either GR-S or *Hevea* in tests conducted to date. Butyl rubber showed exceptionally little change in tangent modulus upon aging at either 35 or 70° C.

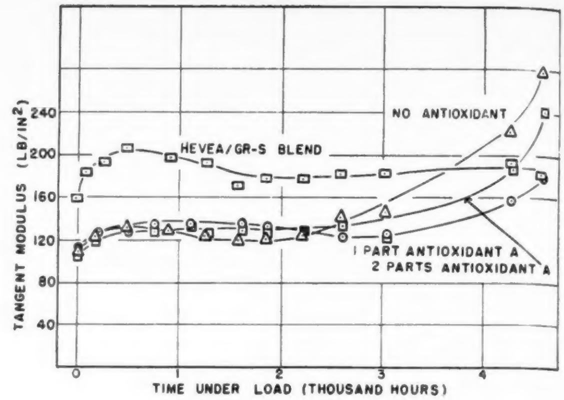



Fig. 18. Tangent Modulus Test for Antioxidant Comparison in *Hevea* at 70° C.


## Acknowledgment

The aid of Lois Johnson, who obtained much of the original data reported in this work, is gratefully acknowledged.The permission of The Firestone Tire & Rubber Co. to publish these results is much appreciated.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# Prevulcanization Heating of Butyl-Carbon Black Compounds

THE tensile and tear strength, resiliency, and wear resistance of Butyl rubber can be greatly increased by heating the mixture of raw Butyl rubber and carbon black prior to compounding with other ingredients. The heat treatment also markedly increases the finished rubber product's resistance to corrosive acids and to the passage of electricity. These results, and the heating technique by which they were obtained, were described to the sixth annual conference of the American Chemical Society's North Jersey Section in Newark on January 25 by A. M. Gessler, Esso Laboratories, Standard Oil Development Co., Linden, N. J.

The treatment described consists of alternately or simultaneously heating and mechanically kneading the mixture of Butyl rubber and carbon black before vulcanization. Only certain types of blacks (the oxy-blacks), however, respond to this treatment; while the others (furnace) require the addition of promoting agents such as dinitrosobenzene or quinone dioxime and sulfur to realize these improved properties.

A theory, accompanied by considerable evidence, was advanced by Mr. Gessler to explain these results. The reinforcement of the rubber by the carbon is contended to be the result of "attachments" formed between the materials; the number of attachments depend on the fineness of the carbon. Heating causes formation of some attachments which break up particle clusters of the black into finer clusters. In this way more attachments are formed which result in the described improvements.

The improved properties are expected to provide superior Butyl rubber products, even Butyl auto tires. The acid resistant properties suggest application of the material as lining for storage tanks, and the electrical resistivity of the new Butyl rubber compounds, said to be increased 10,000,000 times, should appeal to insulation manufacturers.

Some 600 chemists and chemical engineers from the North Jersey area took part in the conference.

# Physico-Chemical and Rubber Reinforcing Properties of Super Abrasion Furnace Black[1]

J. F. Svetlik,[2] H. E. Railsback,[2] and C. C. Biard[2]

PRIOR to 1943 most of the carbon black produced was made by the channel process. Since that time production of black by the continuous furnace process has advanced from a very minor position to the point where it is now the dominant method of production.

Originally furnace blacks were used almost exclusively in synthetic elastomers. Indeed, had it not been for furnace blacks, the progress made in the development and utilization of synthetic rubber would have been greatly retarded. With the advancement in the technology of furnace carbon production, new and improved types of colloidal carbon blacks have been produced which are superior to channel black in both GR-S and natural rubber. Furnace blacks are being used in ever-increasing quantities and are rapidly supplanting channel black in natural rubber.

Research in furnace carbon black production has been directed toward producing progressively more reinforcing colloidal carbons. This development was required to meet the needs of today's automotive transportation which is characterized by higher speeds, heavier loads, and more powerful engines coupled with increased braking demands. Recently Philblack[3] E, which possesses exceptionally high reinforcing characteristics, was introduced. Philblack E has been classified as an SAF (Super Abrasion Furnace) type. The physico-chemical and rubber reinforcing properties of Philblack E are compared to those of MAF, HAF, and EPC blacks in this report.

## Physico-Chemical Properties

Typical chemical and physical properties of SAF, HAF, MAF, and EPC blacks are summarized in Table 1.

TABLE 1. SUMMARY OF PHYSICO-CHEMICAL PROPERTIES

| | SAF Black* | HAF Black† | MAF Black‡ | EPC Black § |
|---|---|---|---|---|
| Particle size, mean diameter, Angstroms | 185 | 250 | 460 | 420 |
| Surface area (electron microscope), sq. m/g | 138 | 98 | 58 | 70 |
| (Nitrogen adsorption), sq.m/g | 132 | 82 | 40 | 131 |
| Iodine adsorption, mg/g | 146 | 91 | 41 | 80 |
| pH | 9.3 | 9.1 | 9.7 | 3.8 |
| Volatile matter, % | 2.17 | 1.13 | 1.13 | 6.25 |
| Ash, % | 0.160 | 0.156 | 0.118 | 0.050 |
| Acetone extract, % | 0.17 | 0.20 | 0.30 | — |
| Tint¶ | 202 | 174 | 114 | 226 |
| Oil absorption, cc/g | 1.60 | 1.20 | 1.25 | 1.02 |

*Philblack E.
†Philblack O.
‡Philblack A.
§Wyex.
¶C. W. Sweitzer, W. C. Goodrich, *Rubber Age*, (N. Y.), 55, 474 (1944).

Particle size of Philblack E is on the average much smaller than that of the other furnace blacks; hence, Philblack E has a correspondingly greater surface area. Philblack E is similar to HAF and MAF blacks in pH, ash content, and acetone extractable matter and slightly higher than these two in volatile content.

The extremely small particle size, greater iodine adsorption, and high tinting strength indicate that Philblack E is highly reinforcing. The greater value of oil adsorption shows that Philblack E possesses a high degree of "structure."

## Processability Studies

Difficulty of processing carbon blacks in rubber compounds ordinarily increases as the black increases in reinforcement potential. Since SAF blacks are more reinforcing than other rubber-grade blacks, it was considered desirable to ascertain its effect on processability. The mixing characteristics of SAF, HAF, MAF, and EPC blacks were compared in the laboratory Midget Banbury operating at 33 rpm. and 250° F. jacket temperature according to the method described by Sperberg, Bliss, and Svetlik.[4] The batches were 1.8 times the following basic recipe:

| | |
|---|---|
| GR-S-1500 | 100 |
| Black | 50 |
| Softener | 10 |

Typical test data in Table 2 obtained in this study for stocks mixed for four minutes show that Philblack E gives a harder stock which requires more power to mix. In factory processing slightly more softener would be required with Philblack E to reduce the Mooney to the desired level. Philblack E incorporates very rapidly and is similar to the HAF and MAF blacks in this respect. In fact, Philblack E is almost completely dispersed after two minutes' mixing in the Banbury. EPC black, on the other hand, disperses slowly, and considerable loose carbon remains at the end of the four-minute mixing cycle. When the stocks are extruded through a Garvey die,[5] it is observed that the Philblack E compound is slightly rougher than the MAF or HAF stocks, but smoother than the EPC stock. The Philblack E stock exhibits a slightly greater tendency to swell after extrusion than the MAF or HAF compounds, but is superior to the EPC compound (see grams per inch extrusion data in Table 2).

Factory processing tests substantiate these data. In general, Philblack E tread stocks require approximately two parts more softener than HAF tread compounds for

[1] Presented before the Division of Rubber Chemistry, A. C. S., Boston, Mass., May 27, 1953.
[2] Phillips Petroleum Co., research division, Bartlesville, Okla.
[3] A trade mark.
[4] *Ind. Eng. Chem.*, 41, 1641 (1949).

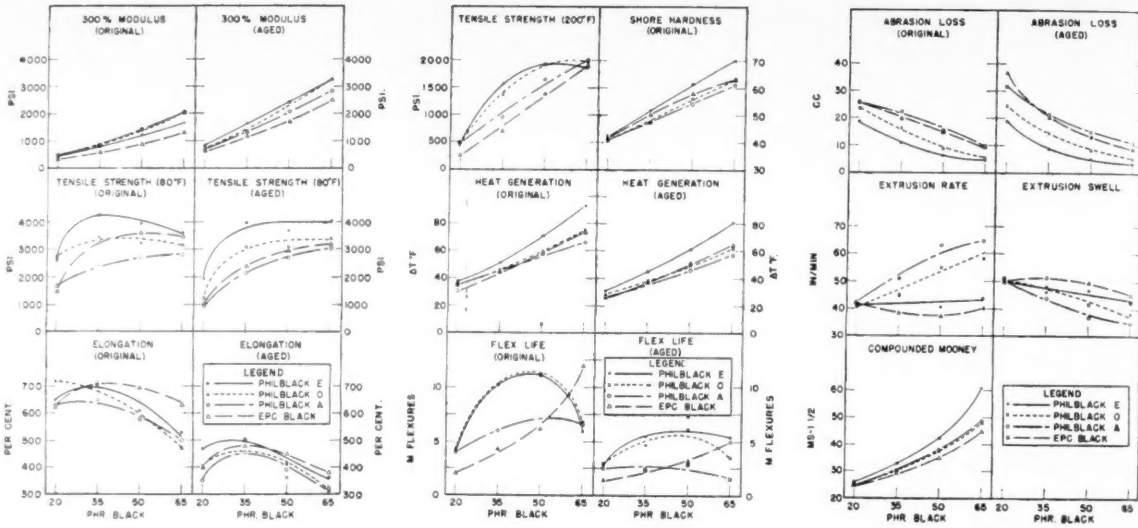


**Fig. 1. Effect of Variable Black Loadings on Physical Properties in GR-S-1500**

satisfactory processability. The Philblack E tread compounds generally must be extruded through a die of slightly smaller dimensions than that used for HAF compounds to compensate for the difference in swelling characteristics.

Table 2. Laboratory Processing Data in GR-S-1500 (X-723)
(4 Minutes' Mixing Time)

| | SAF | HAF | MAF | EPC |
|---|---|---|---|---|
| Power consumption, watt-hours | 578 | 533 | 486 | 480 |
| Dump temperature, °F. | 318 | 305 | 290 | 305 |
| Mooney, ML-4 at 212° F. | 110 | 83 | 77.5 | 87 |
| Extrusion, grams/minute | 74.3 | 81 | 93.3 | 76 |
| Grams/inch | 2.10 | 2.02 | 2.03 | 2.24 |
| Rating | 8+ (2.4−,3−) | 10 (2+,4−,4−) | 11− (3,4−,4) | 8 (2,3+,3−) |
| Observations, loose black | none | none | none | some |

The relative processing characteristics of SAF and HAF blacks in natural rubber have also been compared in a laboratory "B" Banbury. Philblack E was mixed in a blended and in a premasticated No. 1 smoked sheet. A typical tread-type recipe containing four phr. pine tar softener was utilized.

The data in Table 3 show Philblack E gives a tougher stock than HAF black. Reducing the Philblack E loading to 45 phr. improves the processability. When 42-Mooney premasticated rubber is utilized, the Philblack E stock processes easily. This compound is characterized by low compounded Mooney, a rapid rate of extrusion, and low die swell. These data suggest that natural rubber should be premasticated to approximately 50 Mooney to obtain the same degree of processability with Philblack E as with HAF black compounded in 60-Mooney blended smoked sheets.

Table 3. Laboratory Processing Data in Natural Rubber

| Raw Mooney of #1 Smoked Sheets ML-4 | SAF Black PHR. | HAF Black PHR. | Dump Temperature, °F. | Compounded Mooney at 212° F. ML-4 | Extrusion at 195° F. In./Min. | Grams/Min. | Rating |
|---|---|---|---|---|---|---|---|
| Premasticated Smoked Sheet | | | | | | | |
| 42 | 45 | — | 220 | 49.6 | 49.9 | 88 | (4,4,4)12 |
| Blended Smoked Sheet | | | | | | | |
| 60 | 45 | — | 230 | 66 | 37 | 76 | (4−,4,4)12− |
| 60 | 50 | — | 235 | 73 | 36.5 | 74.5 | (4,4,4)12 |
| 60 | — | 50 | 230 | 56 | 44.8 | 87.5 | (4,4,4)12 |

Factory mixes of Philblack E in premasticated natural rubber have been processed without difficulty. In one test the rate of extrusion of the Philblack E stock was deliberately increased to twice the rate utilized for an EPC control compound without encountering excessive heat generation or any evidence of scorch.

## Effect of Variable Quantities of Philblack E in Cold Rubber

The effect on physical properties of varying the black loading has been evaluated in a GR-S-1500 (X-723) compound. Philblack E has been compared to HAF, MAF, and EPC blacks at loadings of 20, 35, 50, and 65 parts. The basic compounding recipes utilized in this work are shown in Table 4.

Table 4. Compounding Recipes
Variable Black Loadings

| | | | | |
|---|---|---|---|---|
| GR-S-1500 (X-723) | 100 | 100 | 100 | 100 |
| SAF Black | Variable | — | — | — |
| HAF Black | — | Variable | — | — |
| MAF Black | — | — | Variable | — |
| EPC Black | — | — | — | Variable |
| Zinc oxide | 3 | 3 | 3 | 3 |
| Stearic acid | 1 | 1 | 1 | 1 |
| Antioxidant | 1 | 1 | 1 | 1 |
| Circosol 2XH | 5 | 5 | 5 | 5 |
| Paraflux 2016 | 5 | 5 | 5 | 5 |
| Sulfur | 1.75 | 1.75 | 1.75 | 1.75 |
| Accelerator* | Variable | Variable | Variable | Variable |

| Black PHR. | SAF Black | HAF Black | MAF Black | EPC Black |
|---|---|---|---|---|
| | PHR. Accelerator | | | |
| 20 | 1.4 | 1.4 | 1.4 | 2.0 |
| 35 | 1.2 | 1.2 | 1.2 | 1.8 |
| 50 | 1.1 | 1.1 | 1.1 | 1.65 |
| 65 | 1.0 | 1.0 | 1.0 | 1.5 |

*N-Cyclohexyl-2-benzothiazole sulfenamide.

The physical properties are portrayed as a function of black loading in Figure 1. Philblack E imparts much higher tensile strength than the other blacks. Only 35 phr. Philblack E is required to develop maximum tensile strength. This black imparts equal or slightly lower modulus than HAF black and better elongation.

The highly reinforcing characteristics of Philblack E are evident in the higher compounded Mooney values, greater Shore hardness, somewhat higher heat generation, and much greater resistance to abrasion. Resistance to cut growth (flex life) of Philblack E compounds is equal to that of HAF black compounds in GR-S-1500, and both are superior to the other blacks in this property. Extrusion data show that Philblack E is between HAF and EPC blacks in die swell (cubic centimeters per inch extrusion).

[5] B. S. Garvey, M. H. Whitlock, J. A. Freese, *Ibid.*, 34, 1309 (1942).

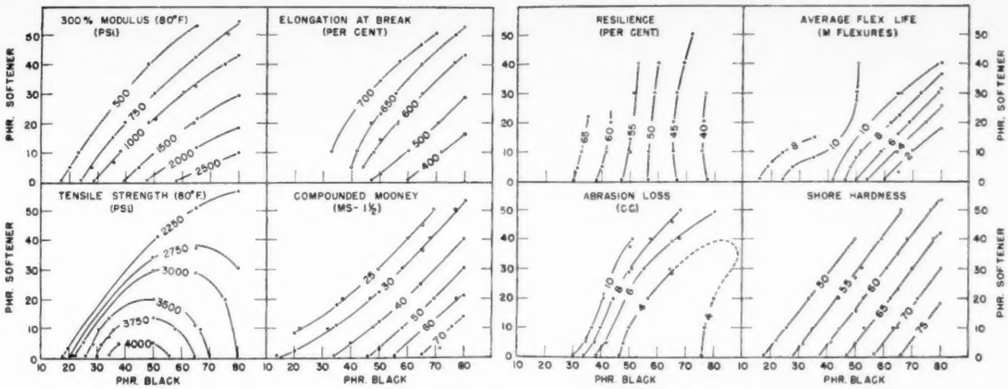


**Fig. 2. Effect of Variable Quantities of SAF Black and Softener in GR-S-1500**

TABLE 5. SUMMARY OF PHYSICAL PROPERTIES AT 50 PHR. BLACK LEVEL IN GR-S-1500

| Black | Compounded Mooney MS—1½ | 300% Modulus Psi. | Tensile Psi. | Elongation % | Heat Generation ΔT °F. | Flex Life M | Shore Hardness | Abrasion Loss—CC. Original | Aged* |
|---|---|---|---|---|---|---|---|---|---|
| SAF | 42 | 1100 | 4060 | 645 | 70 | 11.0 | 61 | 6.0 | 4.9 |
| HAF | 38 | 1450 | 3400 | 600 | 59 | 11.5 | 56 | 9.0 | 8.8 |
| MAF | 38 | 1420 | 2700 | 590 | 56 | 7.2 | 55 | 16.1 | 15.0 |
| EPC | 35 | 940 | 3600 | 695 | 58 | 6.3 | 58 | 14.5 | 13.1 |

*Oven aged 24 hours at 212° F.

Typical test data in Table 5 comparing the four blacks at the 50-phr. level show that Philblack E confers appreciably higher tensile strength and abrasion resistance to GR-S-1500.

Published information[4] shows that the reinforcement potential of a carbon black can be correlated with its ability to immobilize rubber, i.e., the bound rubber or carbon black rubber gel content. The bound rubber has been determined for stocks containing 50 phr. black. The following results show Philblack E immobilizes a significantly greater amount of rubber than the other blacks, which attests to the great reinforcing potential of Philblack E:

| Black | Bound Rubber, % |
|---|---|
| SAF | 21.2 |
| HAF | 16.1 |
| EPC | 10.8 |

## Effect of Varying the Quantities of Philblack E and Softener in Cold Rubber

Modern industry requires rubber goods possessing widely varying physical properties. Since the properties of a rubber compound can be altered most readily by adjusting the black and the softener, a study was conducted to determine how the properties would be affected by varying these two ingredients. The black content was varied systematically from 0 to 80 phr., and the softener level was likewise varied, as shown in the formulations in Table 6.

The test data were first plotted as a function of the black and the softener level. From these graphs a series of isopleths (lines depicting the combinations of black and softener which give equal values of a desired property) was prepared according to the method described by Sperberg *et al.*[6] (Figure 2).

It is seen that modulus, elongation, and hardness vary almost linearly with black and softener content. Tensile strength goes through a maximum both with black and softener level. Resilience is almost independent of softener content, but is decreased by increasing the black loading. Abrasion resistance improves with increasing black content; however, the flex life decreases at higher black loadings. These curves enable determination of the physical properties of stocks containing any combination of black and softener. Or conversely, the different combinations of these two materials may be selected to confer the desired balance of properties. An example of the properties attainable with varying quantities of Philblack E and softener at three levels of processability is shown in Table 7.

[6] L. K. Sperberg, J. F. Svetlik, L. A. Bliss, *Ibid.*, 39, 511 (1948).

TABLE 6. COMPOUNDING RECIPES

Variable Black and Softener Loadings

| | | |
|---|---|---|
| GR-S-100 | 100 | 100 |
| Philblack E | — | Variable |
| Zinc oxide | 3 | 3 |
| Stearic acid | 1 | 1 |
| Flexamine | 1 | 1 |
| Circosol 2XH | — | Variable |
| Paraflux 2016 | — | Variable |
| Sulfur | 1.75 | 1.75 |
| N-Cyclohexyl-2-benzothiazole sulfenamide | 2.0 | Variable |

| 20 PHR. Black Softener* | Accelerator | 35 PHR. Black Softener* | Accelerator | 50 PHR. Black Softener* | Accelerator |
|---|---|---|---|---|---|
| 0 | 1.15 | 0 | 1.05 | 0 | 1.00 |
| 5 | 1.20 | 5 | 1.10 | 5 | 1.05 |
| 10 | 1.35 | 10 | 1.20 | 10 | 1.10 |
| | | 20 | 1.50 | 20 | 1.35 |
| | | | | 30 | 1.60 |
| | | | | 40 | 1.85 |

| 65 PHR. Black Softener* | Accelerator | 80 PHR. Black Softener* | Accelerator |
|---|---|---|---|
| 0 | 0.95 | 0 | 0.90 |
| 10 | 1.05 | 10 | 1.00 |
| 20 | 1.20 | 20 | 1.10 |
| 30 | 1.45 | 30 | 1.30 |
| 40 | 1.70 | 40 | 1.50 |
| 50 | 1.90 | 50 | 1.70 |
| | | 60 | 2.00 |

*1:1 ratio of Circosol 2XH and Paraflux 2016.

TABLE 7. EFFECT OF VARIABLE PHILBLACK E AND SOFTENER QUANTITIES ON THE PROPERTIES OF GR-S-1500 COMPOUNDS

| Philblack E PHR. | Softener PHR. | 300% Modulus Psi. | Tensile Psi. | Elongation % | Resilience % | Flex Life M | Shore Hardness | Abrasion Loss CC. |
|---|---|---|---|---|---|---|---|---|
| **30 Mooney (MS—1½) Stocks** | | | | | | | | |
| 20 | 2 | 570 | 2350 | 560 | 71 | 9.2 | 49 | 20.3 |
| 35 | 10 | 900 | 3700 | 680 | 63 | 9.3 | 55 | 11.2 |
| 50 | 22 | 1000 | 3400 | 640 | 55 | 9.8 | 57 | 6.3 |
| 65 | 37 | 860 | 2600 | 640 | 47 | 15.3 | 59 | 5.2 |
| 80 | 54 | 740 | 2460 | 650 | 42 | 18.0 | 60 | -6.9 |
| **40 Mooney (MS—1½) Stocks** | | | | | | | | |
| 35 | 1 | 1200 | 4050 | 610 | 61 | 11.2 | 59 | 8.0 |
| 50 | 12 | 1360 | 3800 | 590 | 55 | 8.7 | 61 | 4.2 |
| 65 | 25 | 1300 | 3120 | 570 | 45 | 8.8 | 64 | 3.5 |
| 80 | 40 | 1100 | 2660 | 580 | 40 | 10.0 | 66 | 4.6 |
| **50 Mooney (MS—1½) Stocks** | | | | | | | | |
| 50 | 3 | 1810 | 4050 | 510 | 55 | 6.8 | 65 | 3.4 |
| 65 | 16 | 1750 | 3370 | 510 | 45 | 6.0 | 68 | 3.0 |
| 80 | 30 | 1460 | 2760 | 510 | 39 | 5.6 | 70 | 4.0 |

Table 8. Comparison of Blacks in Natural Rubber

Recipe

| | | | |
|---|---|---|---|
| No. 1 smoked sheet | 100 | Pine tar | 3 |
| Black | 50 | Antioxidant | 1 |
| Stearic acid | 3 | Sulfur | 2 |
| Zinc oxide | 4 | Accelerator | 0.4 (0.6 for EPC) |

| Black | Compounded Mooney MS—1½ | 300% Modulus Psi. | Tensile Psi. | Elongation % | Heat Generation ΔT °F. | Shore Hardness | Abrasion Loss—CC. Original | Abrasion Loss—CC. Aged | Minutes to Scorch at 280° F. |
|---|---|---|---|---|---|---|---|---|---|
| SAF | 51 | 1835 | 4480 | 565 | 50 | 64 | 6.8 | 8.7 | 15 |
| HAF | 41 | 1850 | 4060 | 500 | 38 | 61 | 7.7 | 9.7 | 16 |
| MAF | 35 | 1970 | 3680 | 510 | 31 | 59 | 10.2 | 12.0 | 18 |
| EPC | 36 | 1380 | 4210 | 640 | 37 | 57 | 10.9 | 12.0 | 24 |

Table 9. Road Test Results Using GR-S-1500 (Passenger Tires)

| Test | A | | B | | C | | D | | E | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tire Size | 7.00 x 15 | | 7.60 x 15 | | 8.00 x 15 | | 8.00 x 15 | | 8.00 x 15 | |
| Black | SAF | HAF | SAF | HAF | SAF | HAF | SAF | HAF | SAF | HAF |
| PHR. black | 52 | 52 | 42 | 48 | 42 | 50 | 42 | 50 | 42 | 50 |
| PHR. softener | 14 | 14 | 4 | 8 | 4 | 10 | 4 | 10 | 4 | 10 |
| Abrasion index | 142 | 100 | 143 | 100 | 127 | 100 | 137 | 100 | 139 | 100 |

An extremely wide range of physical properties can be obtained by varying the Philblack E and softener levels. At each level of processability stocks varying widely in modulus, tensile strength, resilience, hardness, and abrasion resistance can be formulated.

The effect of varying the black loadings from 20 to 65 phr. in natural rubber was also evaluated. The trends were generally similar to those observed in GR-S-1500 except at the low black levels where the natural rubber stocks are characterized by high tensile strength and elongation. The short summary in Table 8 compares Philblack E to the other blacks.

The high level of reinforcement of Philblack E is evident in the slightly higher compounded Mooney, greater tensile strength, and superior abrasion resistance. Scorch data indicate that Philblack E is similar to HAF black.

If Philblack E had been compounded in premasticated smoked sheets, the Mooney would have been in the same range as that of the HAF black stock. The physical properties imparted by Philblack E in premasticated rubber are substantially the same as those obtained in this study; hence, processability is improved without degrading the properties. If premasticated rubber is utilized, there is no danger of scorching in factory processing.

## Road Test Data

Numerous road tests have been conducted during the past two years on Phillips Petroleum Co. test vehicles as well as by several tire manufacturers to evaluate the performance of Philblack E in tire treads. Philblack E has been compared to HAF black in cold rubber and to EPC black in natural rubber. Several compounding techniques have been investigated to compare road wear performance of tire treads containing different quantities of Philblack E. A brief summary of five tire tests conducted privately comparing Philblack E to Philblack O in 41° F. rubber (GR-S-1500) is given in Table 9.

These data show that Philblack E imparted approximately 35 to 43% better abrasion resistance than HAF black in this elastomer. Estimated mileages to smoothness for the experimental tires were in excess of 50,000 miles for tests A, C, D, and E and in excess of 42,000 miles for test B.

No significant cracking was encountered in Tests A and B, but some tread cracks developed in Tests C, D, and E. A slightly higher softener content might be desirable. Also, tire construction may have influenced tread cracking in the last three tests.

Tire test data comparing Philblack E to EPC black in natural rubber are presented in Table 10.

A substantial improvement in abrasion resistance was obtained when Philblack E was used in natural rubber truck tires.

Table 10. Road Test Results Using Natural Rubber (Truck Tires)

| Test | A | | B | | C | |
|---|---|---|---|---|---|---|
| Black | SAF | EPC | SAF | EPC | SAF | EPC |
| PHR. black | 45 | 45 | 40 | 45 | 40 | 45 |
| PHR. softener | 6.0 | 2.4 | 5.0 | 2.4 | 8 | 4 |
| Abrasion index | 112 | 100 | 124 | 100 | 117 | 100 |

Table 11. Summary of Tread Cracking in Natural Rubber

| Black Type | Cracking Slight | Cracking 1″—2″ | Cracking Total″ | Cuts Slight | Cuts 1″—2″ |
|---|---|---|---|---|---|
| | | Test A* | | | |
| SAF | — | — | 6½ | 15 | 1 |
| EPC | Excessive | | 90 | 8 | 11 |
| | | Test B | | | |
| SAF | — | — | 5¾ | 17 | 1 |
| EPC | Excessive | | 100 | 24 | 3 |
| | | Test C | | | |
| SAF | 4 | — | — | 25 | 1 |
| EPC | 40 | 14 | — | Numerous | 1 |

*Tests A, B, and C in Tables 10 and 11 correspond.

Table 12. Electrical Resistivity of Natural Rubber Stocks

| | 20 Parts Black | 35 Parts Black | 50 Parts Black | 75 Parts Black |
|---|---|---|---|---|
| | Megohm—Cm. | | | |
| SAF | 16,200 | 0.0129 | 0.00109 | 0.000648 |
| Acetylene | 62,000,000 | 0.0885 | 0.00119 | 0.000286 |
| HAF | 185,000,000 | 103.0 | 0.0189 | 0.00361 |
| MAF | 177,000,000 | 5620.0 | 5.60 | 0.0391 |
| EPC | 163,000,000 | 653.0 | 25.7 | 2.16 |

The data in Table 11 show that the Philblack E tires were vastly superior to the EPC controls in resistance to cracking. The exceedingly good resistance to chipping, cutting, and cracking conferred by Philblack E greatly extends the service life of big tires in rugged applications where many tires fail before they are worn smooth.

## Electrical Conductivity Results

The electrical conductivity of rubber compounds is a very important property in many applications. To compare the conductivity imparted by Philblack E with that for other blacks in common use, a series of natural rubber stocks was prepared containing 20, 35, 50, and 75 parts each of Philblack E, acetylene, HAF, MAF, and EPC blacks. The results are presented in Table 12.

The electrical conductivity of Philblack E is generally superior to that of the other blacks, especially at low loadings. A stock containing from 20 to 35 parts Philblack E exhibits excellent conductivity. At 50 and 75 phr. black levels Philblack E and acetylene black impart essentially the same electrical conductivity.

## Conclusions

The physico-chemical properties of Philblack E indicate that this fine particle size colloidal carbon is very highly reinforcing. Studies conducted at various black loadings

*(Continued on page 622)*

# Improved Temperature Uniformity of Calender Roll Surfaces Obtained by Electromagnetic Induction

**Georges Ardichvili**[1]

A MAJOR disadvantage of many machines whose operation involves heated rotating rolls, such as calenders for rubber and plastics processing, is that the surfaces of the rolls show considerable variation in temperature along the axis of the rolls. Temperature variation around the circumference of a roll at any one area between the ends is not so great, but considerable differences do exist between the center and the ends of the roll.

This variation in temperature is due to the variations in the shape and the thickness of the calender roll walls; there are also changes in dimensions at the ends or necks of the rolls that affect roll surface temperature, and at the junction of the ends to the main body of the rolls temperature variations occur. The unevenness of the temperature of calender roll surfaces varies in degree, depending on the type of service; for example, rolling mills, drying rolls in the paper and textile industries, calender rolls for rubber and plastics processing, etc., have different degrees of temperature variation.

## Temperature Variation and Existing Means of Control

The curve of temperature distribution along the length of a roll is usually flat at the center, but drops off steeply toward the ends of the roll. A useful quantitative relation in this connection is as follows: Consider a distance (1) over which a maximum allowable temperature difference ($\Delta T$) is not to be exceeded. The ratio of this distance (1) to the whole length of the working surface of the roll (L) can be defined as the coefficient of uniformity of temperature distribution, thus, $k = 1/L$. The distribution of temperature over the surface of the roll can be considered as completely satisfactory when $k = 1$. If the value of (k) is too low, difficulties may arise in processing when the material handled is sensitive to small temperature changes, as is the case with many plastics and rubbers. In order to avoid wide variations in gage and appearance of the material being calendered, it is necessary to use only part of the total width of the calender roll, with the resultant reduction in machine capacity.

In addition, uneven surface temperature causes variations in the surface contour of the roll. Thus, for a calender 28 inches in diameter, a difference in temperature of 14° F. between the ends and the middle of the roll results in a difference in diameter between the ends and the center of 0.0023-inch, that is, of about the same order of magnitude as the crown of the roll. The necessary correction introduced by the calender manufacturer in the crown of the roll is therefore lost.

The latest and most modern calenders are equipped with high-precision control instruments in order to maintain temperature constant at a given point on the surface of the roll during processing. The effect of variations in temperature on finished product quality is obviously fully recognized, and it is inconsistent, therefore, to tolerate temperature variations along the length of the roll greater than those allowed at a given point by means of the above-mentioned control instruments.

Various means are employed to reduce the temperature differences along the length of calender rolls. One means is the use of drilled rolls in which a series of holes is drilled parallel to the axis of the rolls through which the heating medium is circulated. The temperature differences are reduced, but at the expense of complications in roll construction and increases in the cost of manufacturing the rolls. This method, moreover, is not applicable to existing rolls.

Applying heat to the colder ends of the rolls by means of infrared lamps has also been tried, but in spite of many successful applications of this type heat elsewhere, no measureable improvement in roll surface temperature uniformity has been achieved with calender rolls. The difficulty is due to the inability to accommodate lamps of adequate heating capacity in the limited space available.

## Temperature Control by Electromagnetic Induction

Uniform calender roll surface temperatures can be obtained by the use of electromagnetic induction to raise the temperature of the ends of the rolls. The coefficient of uniformity, (k), can be raised to its maximum value, or, if desired, certain zones of the rolls can be overheated by formation of a magnetic circuit in which the wall of the calender roll is used. The arrangement is shown schematically in Figure 1. The heating is due to the Joule effect of eddy currents in the roll surface metal. A core carrying the induction coils induces a magnetic flux of which one line of force is shown by the dot-dash lines through the surface of the roll and the core in Figure 1. The primary circuit of the apparatus uses normally available alternating current, and high-frequency generators are not required.

The magnetic circuit consists of three parts of very different magnetic characteristics, as follows:

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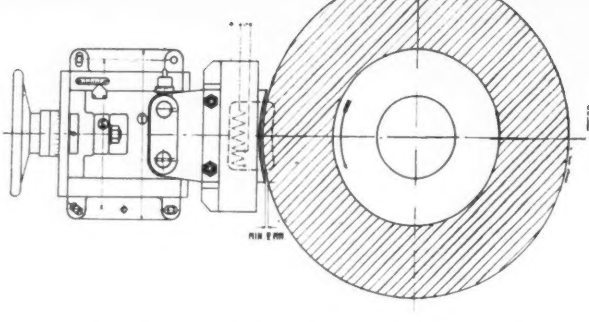


**Fig. 1. Schematic Diagram of a Magnetic Current Temperature Compensator in Position Adjacent to the Surface of a Calender Roll**

1. A laminated core of low magnetic loss and high resistivity.

2. The air gap with no magnetic loss between the core and the roll. This gap is wide enough to allow the passage of the plastic film over the whole length of the roll. The plastic is not affected by the magnetic flux from the core.

3. The wall of the calender roll which has a high magnetic loss, but is generally constructed of ferromagnetic material, such as cast-iron or steel.

With the above magnetic circuit practically all of the energy input to the apparatus is converted into heat in the calender roll.

By altering the width of the air gap, the magnetic circuit can be changed, and the intensity of the heating varied. A hand-wheel on the core apparatus is used to regulate the width of the air gap, thus avoiding regulating equipment involving loss of power, such as resistances. The core apparatus or temperature compensator can also be moved along the axis of the roll. Since the roll is rotated in use, the heating effect is uniformly distributed around the circumference of the roll at whatever area the compensator is located.

A calender roll is usually equipped with two temperature compensators. All the rolls of a calender may be so equipped, but the compensators are particularly useful when installed with the last two rolls from which the finished sheet is removed.

Figure 2 shows the temperatures existing along the surface of a calender roll 550 millimeters (21.6 inches) in diameter by 1,550 millimeters (61 inches) long, with and without the use of the electromagnetic temperature compensators.

Curve A in Figure 2 shows the temperature from one end to the other of the roll heated by steam in the usual manner. The middle portion of the curve consists of a flat portion at 168.5° C. The temperature drops about 8° C. at either end. For an allowable temperature difference ($\Delta$ T) of 1° C., the coefficient of uniformity, k = 0.64.

Curve B in Figure 2 is the temperatures obtained with two compensators placed in the position shown shaded in the drawing, after 15 minutes' heating at reduced power. The coefficient of uniformity in this instance was 0.92.

Curve C shows the temperatures obtained by increasing the amount of power used and in which the temperatures at the ends of the rolls are now higher than those in the middle of the roll.

## Summary and Conclusions

The difficulty in maintaining uniform temperatures on the surface of calender rolls, particularly along the axis of the roll from one end to the other, has necessitated the use of drilled rolls which are more expensive to manufacture than chamber bored rolls. A device employing magnetic current and using the wall of the calender roll as part of the apparatus has been developed which greatly improves the temperature uniformity of the surface of the roll.

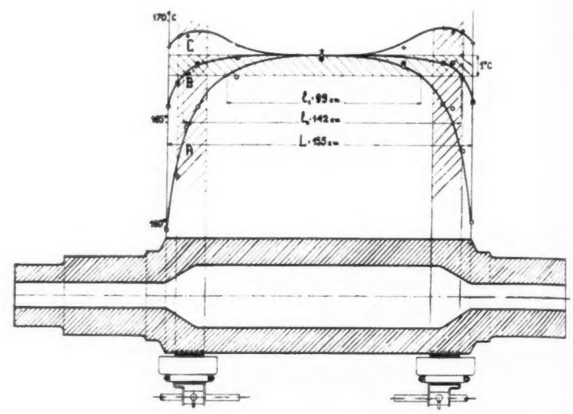


**Fig. 2. Temperature Curves from One End to the Other of Calender Roll. A Is Curve for Chamber Bored Roll Heated with Steam; B Is Curve for Same Roll with Two Compensators in Use, but with Reduced Power; C Is Curve with Two Compensators in Use at Higher Power**

## Properties of SAF Black

*(Continued from page 620)*

in GR-S-1500 and in natural rubber in comparison to HAF, MAF, and EPC blacks confirm the improved reinforcement attainable with Philblack E. Processing studies have shown that Philblack E requires slightly more power for incorporation and gives a harder stock than other blacks, but the rate of incorporation is essentially equal to that of HAF black and faster than that of EPC black.

A wide range of physical properties can be obtained by varying the Philblack E and softener level. Data have been developed to facilitate the proper choice of black and softener levels to yield stocks varying in ease of processability, tensile strength, hysteresis, hardness, and abrasion resistance.

Passenger tire tests have shown that Philblack E is 35 to 43% superior to HAF black in GR-S-1500 tread stocks. In natural rubber truck tires Philblack E has been shown to be 12 to 24% superior to EPC black. Markedly superior resistance to cutting and cracking has been obtained in natural rubber with Philblack E, compared to EPC black.

Philblack E imparts better electrical conductivity than most other carbon blacks, especially at low loadings. Philblack E is superior to acetylene black in electrical conductivity at 20 and 35 phr. loadings and is equivalent to acetylene black at 50 and 75 phr. levels.

# Editorials

## When Will the Natural Rubber Industry Face the Facts?

IN SPITE of the good work that is being done by one small part of the natural rubber producing industry (The International Rubber Research Board), to prepare that industry for its forthcoming competition with privately produced synthetic rubber from the United States and Canada, the major and controlling part of the industry is apparently persisting in its ostrich-like "head-in-the-sand" attitude.

Ever since the results of the special meeting of the management committee of the International Rubber Study Group of October, 1953, in London made it evident that no "buffer stock" or international stockpile of natural rubber was likely to be realized, the natural rubber producing interests have been searching for some means of raising the market price. The management committee's recommendations in themselves for reviewing the United States stockpile rotation procedure, eliminating the mandatory synthetic rubber consumption requirement in this country, and for raising the price of GR-S in order to bring up the price of natural rubber, were the opening guns in this campaign.

In November, the *Straits Times* of Singapore launched a trial balloon suggesting that Malaya and Indonesia institute "orderly and controlled restriction" rather than abandon smallholdings or close down less efficient estates in the face of declining prices and production of natural rubber. At about the same time it was proposed that Malaya develop its own buffer stock.

In early January it was reported from Malaya that Britain's Chancellor of the Exchequer, R. A. Butler, while on a visit to the Far East for a meeting in Sydney, Australia, of Commonwealth Finance Ministers, stated that stockpiling of more natural rubber was being considered by the United Kingdom in order to help the Malayan rubber industry.

Also in January the suggestion was made that Malaya and Indonesia hold regular meetings at least twice a year to iron out differences in plans and policies in connection with the natural rubber market and price. It seems that the Malayan producers favor planned replanting with high-yielding stock, while Indonesian producers cannot see the desirability of providing for increased production when a surplus exists. Neither do the Indonesians accept the prediction that total new rubber consumption by 1960 and beyond will be considerably in excess of that at the present time.

When is the majority of the natural rubber producing industry going to face the facts and realize that the future for that industry lies in producing more and better rubber at lower prices and not in artificially bolstered higher prices for less rubber? As stated in this column in November, 1952:

"A seller's market for natural rubber is a thing of the past. Improved quality, better packing and shipping, technical uniformity, technical service to customers, and even special grades for special uses will soon be the order of the day for natural rubber if it expects to retain its share of the market, not only in the United States, but also in many consuming countries around the world."

The *Straits Times* on December 2, 1952, commented at length on the work of The Rubber Manufacturers Association's Crude Rubber Committee in 1952 with its quality program for natural rubber and summed up the situation as follows:

"The basic conclusions of the RMA seminars are sound and, for the rubber producer and the Malayan rubber industry as a whole, instructive. There must be scrupulous regard for the customer throughout the present system of visual grading. . . . It will then be possible to concentrate on an advance in technical grading, recognizing that technical uniformity will be essential in future competition with synthetic. W. J. Sears, vice president of the RMA, repeats a point that cannot be emphasized too often. When synthetic rubber plants are in private hands, competitive research will unquestionably bring vastly improved materials of technical uniformity such as the producer of natural rubber is in no position to offer. The research specialists in the natural rubber industry face vital problems which some sections of the industry unfortunately are in danger of persuading themselves do not exist."

It is apparently these certain "sections of the industry" that are influencing the overall policy of the whole industry to the extent it may suffer serious setbacks in the not-too-far-distant future. The American Government and the consuming industry in this country are doing all they can to help the natural rubber producing industry. The recent recommendations of the management committee of the IRSG are being acted upon except for arbitrarily raising the price of GR-S. With a $60 million profit for fiscal 1953, a higher price for GR-S is inconceivable.

If the natural rubber industry will devote more time and funds to the work of its International Rubber Research Board in promoting such projects as Technically Classified Rubber and in working with the RMA and RTA of N. Y. on international standards for packing and grading, and less to ways and means of artificially stimulating the price of present ordinary grades of natural rubber, it will be better able to cope with the competition of privately produced synthetic rubber in the United States and Canada in 1955 and beyond.

R. G. Seaman

# Injection Molding of Elastomeric Vinyls—I[1]

**Frank A. Martin**[2]

POLYVINYL chloride plasticized formulations have been available to injection molders for about 15 years. In 1938 the production of vinyl resins was about 15,000 pounds. Now it is approximately 500,600,000 pounds annually. Yet the estimated consumption of PVC for molding is only six to ten million pounds annually. Why did the vinyl resin industry grow so large so rapidly without molding becoming an important part of its growth? It is my purpose to try to explain why molding of vinyls has lagged behind the general growth of the industry and also to show some of the things which can be done to make molding of vinyls more popular among the custom molders.

The field for molded vinyls is practically unlimited. The applications being molded now will undoubtedly stimulate thinking which will result in many more applications. In the field of sporting goods are swim fins and goggles, bicycle grips, and dog collars and leashes. Luggage binding and handles are common. Around the house you will find toys, dolls, hair curlers, fly swatters, and atomizer bulbs. The hair curlers alone take 55,000 pounds of materials per month in three molds. In the appliance field vacuum cleaners are equipped with vinyl bumpers, brushes, handles, and bellows, and possibly electrical cord plugs and strain reliefs. Refrigerator drip trays are now in the field. The automotive industry uses vinyl materials in door-latch knobs, distributor-cap nipples, and light gaskets, and the list of vinyl moldings is just starting to grow.

The market for molded PVC is the field now occupied by molded rubber goods. As you can see from the examples quoted, injection molding of PVC can easily be competitive to mechanical rubber goods where the properties are satisfactory. On a volume basis PVC compounds are more expensive than the average rubber compound. However, the injection molding cycles of from ½-minute to two minutes are only a small fraction of the six- to 30-minute curing cycles for rubber. I believe that injection molding of PVC parts up to three or four ounces can compete on a very satisfactory basis with rubber molding. Beyond that weight the higher material costs of vinyl are likely to outweigh the production economies of injection molding, but new compounding techniques which I shall discuss later will narrow the material cost margin.

## Properties of PVC

The physical properties of the elastomers are in many ways superior to rubber. Polyvinyl chloride is inert to the deteriorating effects of oxygen and thus does not suffer the same aging effects as rubber, such as decrease in tensile strength and elongation with the attendant surface cracking. The vinyl compounds are in general more resistant to chemicals and solvents, with certain exceptions. They can be plasticized to give much the same range of hardness as rubber and a wide range of brilliant, stable colors is available. Vinyl compounds can be molded with a high surface gloss finish not obtainable with rubber. The inherent toughness of the material makes this finish more resistant to scuffing and marring than a rubber compound of comparable hardness. The vinyl materials have good abrasion resistance, low water absorption, and are self-extinguishing. They are non-toxic and may be compounded to be odorless and tasteless. By suitable selection of compounding ingredients excellent electrical properties may be obtained.

In contrast, the vinyl elastomers also have certain less desirable properties. One of the foremost of these is their temperature limitations. Because of their thermoplastic nature, the plasticized vinyls soften at elevated temperatures. A maximum operating temperature of 140° F. is usually recommended. Some applications at temperatures of 170° F. have been made, however, and molded parts will not "unmold" at 200° F. although they become much softer. There are also low-temperature limitations. With decreasing temperatures vinyls become progressively stiffer and less flexible, and they become brittle at temperatures higher than does rubber. Selection of suitable plasticizers will lower the brittle point, but no plasticizers are available which will allow PVC to compete with rubber for extreme low-temperature applications.

Another possible limitation to the use of soft vinyls is the loss of plasticizer by volatilization, or migration of plasticizers into adjacent plastic or painted surfaces. By careful selection of plasticizers these objections may be considered negligible for the majority of applications. Since PVC is a saturated linear polymer incapable of the cross-linking afforded by the sulfur vulcanization reaction of rubber, the vinyl compounds do not exhibit resilience and elasticity to the same degree as does rubber. They are, therefore, in general not suitable for dynamic applications where elasticity is a requisite factor.

[1] Presented before the Buffalo Section, Society of Plastics Engineers, Inc., Buffalo, N. Y., Oct. 16, 1953.
[2] The Hoover Co., North Canton, O.

While vinyl resins are not soluble in aliphatic hydrocarbons, care must be exercised in their compounding since the hydrocarbons may extract the plasticizers and stiffen the compounds. Vinyls are inert to dilute acids, alkalies, and alcohols, but are soluble in ketones, chlorinated hydrocarbons, esters, and ethers.

The favorable properties of vinyl elastomers are being utilized in a multiplicity of molded applications. Many of these applications are the result of superior color and finish. Others are the result of manufacturing economies, and still others take advantage of the abrasion resistance, toughness, and good aging.

## Molding Methods and Problems

Elastomeric vinyl plastic articles may be molded by any one of three methods: compression molding or injection molding of dry powders or granules, and slush molding of plastisols.

Compression molding is of only limited application. Owing to the thermoplastic nature of the materials the molds must be cooled while under pressure, with the result that molding cycles are very long, and costs are high. Compression molding does have two advantages. Excellent surface finishes can be obtained readily, and the exposure to heat is relatively brief so that the danger of heat degradation is small.

Slush molding of plastisols is outside the scope of this discussion, but it should be mentioned briefly. The process is economically sound and produces parts that are of excellent quality. Several companies have built automatic machines for slush molding. This process is becoming an ever-increasingly important factor in the vinyl molding picture.

Naturally, the logical approach to molding these vinyl elastomers is by means of injection machines. The injection process is inherently a rapid one so that labor costs are low. By injecting the material into the closed die, there is no flash or overflow to trim. The rapid mold turnover permits large-quantity production with relatively few cavities. The practical aspects of injection molding of soft vinyls, however, are far from simple. Probably the primary cause of trouble in injection molding lies in the poor heat stability of the vinyl resins. This factor together with the low thermal conductivity of the vinyl compounds accounts for the molder's chief difficulty—inability to achieve complete, uniform plasticization in the heating cylinder before thermal degradation sets in.

This non-uniform plasticization results in molded parts which may contain overheated, underplasticized, and well-plasticized material in the same piece. The properly plasticized material gives an excellent reproduction of the mold finish. Overheated material shows up as small teardrop, patterns commonly referred to as "splash" marks. This condition is similar in appearance to the mica marks commonly obtained when molding damp cellulosics. Underplasticized material shows up as dull spots, pronounced flow lines, and weak welds.

It may, therefore, be concluded that the solution to doing a good injection molding job with soft vinyls lies in getting complete and uniform plasticization of the compound without subjecting the material to sufficient heat to cause thermal decomposition.

## Thermal Stability and Conductivity

Before considering methods of achieving this highly desirable degree of plasticization, it is first necessary to understand the problems imposed by the poor thermal stability and conductivity of the vinyl materials. Stabilizers such as lead, tin, and cadmium compounds are incorporated in all vinyl compounds, and they do improve the heat stability to a very marked degree. In spite of this improvement no compounds are yet available which will satisfactorily withstand the times and temperatures to which they may be exposed in an injection machine heating cylinder. Cylinder temperatures range from 330 to 380° F. or even higher, with 360° F. a commonly used temperature. Even though the torpedoes or spreaders in the cylinders have been streamlined as much as possible to eliminate obstructions where material may lodge and remain motionless for long periods of time, the streamlining is far from 100% effective. Therefore, despite all precautions, it is impossible to keep some of the material from staying in the heating zone until thermal degradation sets in. The initial effect of exposure of PVC to excessive heating is change in color. The normal water-white resin passes through a pale straw color, to a reddish brown, to black on progressive heating. Once decomposition starts, the products of decomposition appear to accelerate the degradation reaction.

One of the end-products is a carbonaceous mass. This forms first on the liner of the cylinder and acts as a thermal insulator. It then becomes necessary to increase the cylinder temperature to get enough heat through this carbonaceous barrier to plasticize the material in the inner layers. The higher heat encourages the formation of more carbon, which means that still higher heats are required to penetrate the barrier layer. There is no end to the decomposition cycle. When the decomposed material in the cylinder reaches a certain stage, it begins to break loose and come through into the product. At this point it becomes necessary to dismantle the cylinder, clean out the burned material mechanically, and start over. It has been a common experience that cylinders can be run from one week to two weeks on the average between cleanings.

The necessity of never allowing vinyl materials to overheat in an injection machine heater cannot be overemphasized. Precautions must be observed in starting a job to see that an occasional purging shot is taken as the material comes up to heat. Even more important is purging at the end of a shift or run. The heat should be shut off, and molding continued as long as the material will flow. Then the mold should be pulled from the nozzle, and further purging continued until the material temperature drops below 250° F.

Figure 1 is a photograph of a 50-Shore hardness natural unfilled vinyl molding compound which was removed from an injection cylinder after burned material started to come through into the molded parts. Note the areas of burned material around the supporting fins of the spreader, and at the bottom where the material feeds into the nozzle. At these points the streamlined flow is obviously imperfect. In the center portion there are also burned areas. Many times the material is in a much further advanced state of decomposition, when a cylinder is dismantled, than is show by this photograph.

Other products of thermal decomposition of polyvinyl chloride are hydrogen chloride and water. The hydrochloric acid so formed will attack chrome-plated cylinders. It may become necessary after extensive molding of vinyl compounds to refinish and replate the cylinders.

The problem of plasticizing vinyl elastomers by heat is aggravated by the poor thermal conductivity of these materials. Measurements were made of the relative thermal conductivities of typical vinyl, styrene, and cellulose acetate molding compounds in two different ways. In the one case the conductivity of a solid block two by two by one inch was measured. Realizing that the conduc-

tivity of a solid mass would differ from that of loosely packed granules, a setup was made whereby the conductivity could be measured at various percentages of packing.

Figure 2 illustrates a miniature replica of a heating cylinder. Thermocouples attached to a recording potentiometer served to measure the temperatures at six points simultaneously so that the progress of heat transfer through the material could be followed. With this equipment the effect of packing could be investigated.

Measurements of conductivity on the solid blocks rated the three materials in the following relative order: cellulose acetate — 1.00; elastomeric vinyl — 0.89; and polystyrene — 0.79. Conductivity was also determined by means of the miniature heating cylinder for 54% and 84% packing. In each case the cellulose acetate exhibited the highest heat transfer rate. At 54% packing the PVC showed the lowest conductivity, as evidenced by the fact that for the inner thermocouple to reach a temperature increase of 200° F. required 68 minutes for cellulose acetate, 76 minutes for polystyrene, and 96 minutes for the PVC. In other words, the PVC required 40% longer time to attain a temperature rise of 200° F. than did cellulose acetate. At 84% packing the cellulose acetate again showed the best thermal conductivity, reaching a 200° F. rise in 45 minutes, but the order of the polystyrene and PVC was reversed. The styrene required 65 minutes and the vinyl compound 55 minutes. These results rate the thermal conductivity in the same order as did the measurements on solid blocks.

Just which set of data is applicable to injection molding operations cannot be determined. Certainly the granules are loosely packed at the feed end of the cylinder, and just as certainly they have lost their identity at the nozzle end and are in a solid mass. There is undoubtedly a gradual increase in packing from the feed end to some point in the center where 100% packing is reached. In any event these experiments show that elastomeric PVC compounds are not, generally speaking, so good thermal conductors as are some of the other thermoplastic molding materials. It is to be expected, therefore, that the plasticizing rate will be slower. The combination of low heat conductivity and poor thermal stability thus constitutes a formidable barrier in the process of injection molding.

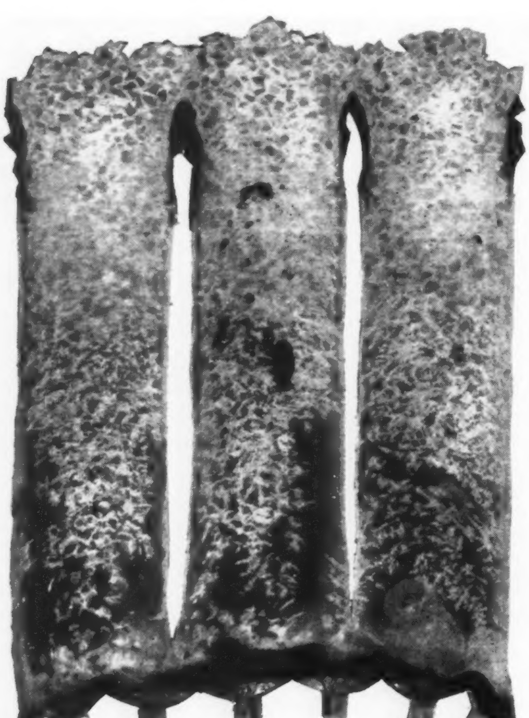


Fig. 1. Photograph of Unfilled Vinyl Molding Compound Removed from an Injection Machine Cylinder after Burned Material Began to Appear in the Mold

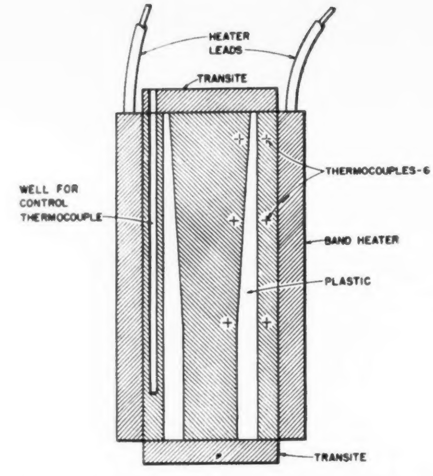



Fig. 2. Miniature Replica of Heating Cylinder Used in Thermal Conductivity Tests

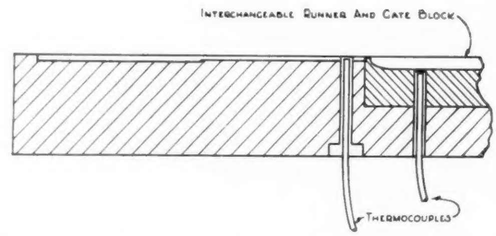



Fig. 3. Portion of Mold Used to Determine Effect of Material Flow Restrictions on Temperature

I have seen discrete granules of material in the sprues of the same shots which filled the mold cavities with apparently good parts. Certainly that condition indicates the difficulty of getting good plasticizing action. Increasing cylinder temperatures in these cases only resulted in burning before good plasticization was obtained.

## Better Plasticizing Action

There are two possible ways to attack the problem of getting better plasticizing action. One method is to improve the compounds. That implies increasing the heat stability of the resin or the thermal conductivity of the material. Other angles of attack on the compound may be to develop better flow characteristics either through the use of internal lubricants or by developing new resins with better temperature-viscosity characteristics. That field of endeavor must largely fall in the realm of the material manufacturers. It should be a highly rewarding field of research, since the development of an elastomeric vinyl compound which can be molded without any of the troubles presently encount-

ered should greatly stimulate the interest of molders and users in these materials.

From the molder's point of view, the problem of getting better plasticizing action can be broken down into several approaches, all of which have been tried with varying degrees of success. The first of these approaches is through generating a flash of heat in the material momentarily during the injection stroke. A second approach is through the use of a screw pre-plasticizing type of machine. Still another approach is through the use of dry blends which have relatively little heat history. Let us now consider separately each of these angles of attack to the plasticizing problem.

### Heat Generation during the Injection Stroke

The conventional type of injection machine can be used to generate frictional heat by forcing the semi-plasticized material from the heating cylinder through a restricted passage. We currently have under way a study of heat generation in relation to gate size. Figure 3 shows a fragmentary view of a mold designed to permit measurement of temperature changes brought about by restriction of flow. It is impossible or at least difficult to get a temperature measuring element directly in the material stream; so we have embedded thermocouples in the mold within 1/16-inch of the material passages. The mold is constructed with replaceable gate blocks; so the effect of various types of restricted flow can be ascertained. With the thermocouples embedded in the mold, the metal conducts heat rapidly away from the thermocouple; so we could not measure the absolute temperature rise in the material. However we could measure the relative effects of different types of gates.

This investigation is just getting under way, and we are not ready to report our findings generally. I can say, however, that we have confirmed the frictional heat theory. We measure temperature rises in the neighborhood of 20 to 30° F. during the injection stroke. Increased injection pressure makes the temperature rise even greater, as might be expected from the increased velocity.

This principle of restriction of flow, or flash heat generation, can be put to work in production molding operations Heat can be generated by forcing the material through a small nozzle opening. The use of nozzles with 0.080- to 0.100-inch diameter openings materially aids in the plasticizing of PVC. Nozzles with openings down to 0.062-inch diameter have been used experimentally with excellent plasticizing action resulting. This nozzle opening is too small, however, to pass flakes of carbon or tramp metal, and frequent removal of the nozzle for cleaning is required.

The use of restricted gating will further increase the plasticizing action. If the gates are too small the heat generated may be excessive, causing rejects due to splash marks. On the other hand, when the gate section is too large, the frictional heat may be insufficient to finish the plasticization. In that case dull or cold spots appear in the molded piece. It is difficult to establish the optimum gate size, particularly when pieces of large surface area are being molded. The runners should be full round and of generous size for restricted gating.

In a discussion of restricted gating for PVC molding,[3] Bostwick and Joslyn describe the detailed steps they took to get the correct gating for several molds. These workers believe it advantageous to restrict the material flow approximately 3/4-inch from the cavity entrance, have the restricted stream of material impinge on an obstruction to form a button, then go into the cavity through a flat gate which is essentially equivalent to the part thickness and relatively wide.

We have tried this system of restriction several times, with rather inconclusive results. I believe that the inference to be drawn is that for any given mold, machine, and material, some particular gating condition can be worked out experimentally which will result in good pieces without objectionable flow lines, and with a good glossy finish.

*(To be concluded)*

[3] "Restricted Gating." *Modern Plastics*, 31, 125 (1953).

# Meetings and Reports

## SPE Section Reports

### Joint New York-Newark Meeting

APPROXIMATELY 160 members and guests attended a joint dinner-meeting of the New York and Newark sections, Society of Plastics Engineers, on January 13 at the Military Park Hotel, Newark, N. J. Speakers at the technical session were Maurice H. Bigelow, Barrett Division, Allied Chemical & Dye Corp., who discussed "Reinforced Plastics," and Wayne I. Pribble, Barrier-Pribble & Co., on "Mold Design—Profit or Loss."

Dr. Bigelow began his talk with a brief review of the phenomenal growth of glass-reinforced polyester resin laminates, noting that a resin sales volume of 90,000,000 pounds has been forecast for 1960, a six-fold increase over current sales. After describing the types of resins employed in the laminates, the speaker discussed the need of precoating the glass fibers with an organosilicon size to improve the water resistance and weathering properties of the laminates.

While most major applications to date have been in boats, fishing rods, and military uses, promise for continuing growth in the future lies in the use of the laminates in structural parts, furniture, and light diffusion panels. The speaker urged, however, that the industry recognize the need of discarding present hand-made methods of manufacturing parts and swing toward the use of matched metal molds and professional methods of manufacture and assembly.

Mr. Pribble spoke on the general aspects of mold design, emphasizing that full responsibility for good design must rest with the molder. The molder can increase his profits by keeping accurate records; proper selection of mold making bids; retaining full control of the mold's physical aspects; knowledge of the plastic materials to be used; proper examination and checking of mold drawings, with revisions made during the drawing stage; encouraging the exchange of information among molder, designer, and mold maker; and by permitting the designer to observe molds during construction, testing, and operation.

Mold design factors conducive toward greater losses by the molder were given by the speaker as follows: never checking old molds before making replacement parts; allowing the mold maker to use the methods easiest for him; refusing to divulge information on the part and its application; taking too much time on mold design; inadequate rewards for good designers; and refusing to make any commitments on preliminary mold layout drawings.

J. L. Bonanno, of Lionel Corp. and Newark Section president, presided over the meeting and introduced his fellow officers and the New York Section officers. The speakers were introduced by E. B. Soules, of Detroit Mold Engineering Co. and Newark program chairman. The meeting also included the distribution of table favors and door prizes.

The New York Section has announced the appointment of the following committee chairmen for the coming year: program (to July 1), H. H. Dash, Arma Corp., and (after July 1), C. W. Virgin, Naugatuck Chemical Division, United States Rubber Co.; membership, Guy Martinelli, Sylvan Plastics, Inc.; house, A. L. GeWertz, manufacturers representative; credentials, G. B.

Baron, Ideal Plastics Corp.; favors and prizes, A. S. Jacobs, Pressman Toy Corp.; employment, Sam Silberkraus, Riverdale Plastics Development Corp.; education, H. J. Weber, Rotuba Extruders; and publicity, A. M. Merrill, India RUBBER WORLD.

## Chicago Dinner-Dance

THE fourth annual Christmas dinner-dance of the Chicago Section, SPE, and the Midwest Chapter, SPI, was held December 5 at the Edgewater Beach Hotel, Chicago, Ill. More than 450 members and guests of the two groups attended the event, which included a cocktail hour, dinner, entertainment program of variety acts, and an evening of dancing. Arrangements for the party were handled by Warren Cooper, Tennessee Eastman Corp., and William K. Woodruff, Celanese Corp. of America.

## Vinyl Film Quality Program

THE vinyl film industry has inaugurated a national and local level program to inform the public of a continuing standard of quality in its products. Details of the program were announced at a luncheon for industry members and the press given by the Society of the Plastics Industry, Inc., on January 5 at the Commodore Hotel, New York, N. Y.

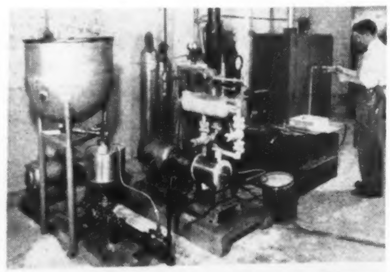
The Vinyl Film Standard of Quality, as established by film processors and resin producers who are members of SPI and as approved by the United States Department of Commerce in Commercial Standard 192-53, is the industry's assurance of continuous quality in film with regard to appearance, usefulness, durability, and performance. The standard provides specifications for thickness tolerances, yield per roll, width tolerances, shrinkage at elevated temperatures, contamination, appearance, crocking, tensile properties, tear resistance, flammability, volatility of plasticizer, water extraction, and low-temperature impact.

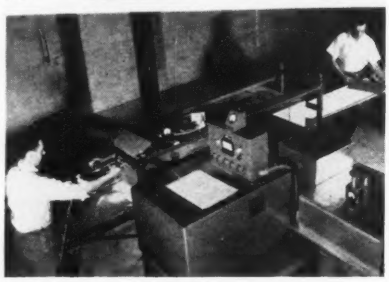
To identify products manufactured of vinyl film made in compliance with the standard, the SPI has adopted a Vinyl Film Seal of Quality which also shows the gage number of the film of which the product is made. This seal will implement the buying of film made in compliance with the standard and also keynote an educational program aimed at retailers and the buying public. The program will include national advertising and publicity in magazines, newspapers, radio, and television; dealer promotions; informative aids for retailers; and visual presentations to retail groups in key markets.

The program was announced by SPI President John J. O'Connell, Consolidated Molded Products Corp., who paid tribute to the industry sponsoring firms, as follows: Bakelite Co.; Dow Chemical Co.; Elm Coated Fabrics Co.; Firestone Plastics Co.; General Tire & Rubber Co.; B. F. Goodrich Chemical Co.; Goodyear Tire & Rubber Co.; Harte & Co., Inc.; Monsanto Chemical Co.; Naugatuck Chemical Division, United States Rubber Co.; Presto Plastics Products Co., Inc.; Respro, Inc.; Ross & Roberts Co.; and Rubber Corp. of America.

### Mittman on Vinyl Quality

This newly established Standard of Quality and Seal of Quality for vinyl film products was discussed by Bernard Mittman, Elm Coated Fabrics Co., in an address delivered before the forty-third annual convention of the National Retail Dry Goods Association in the Statler Hotel, New York, N. Y., on January 13. As chairman of the vinyl film processors committee of The Society of the Plastics Industry, Inc., Mr. Mittman was instrumental in establishing the quality standard for the SPI.





**Equipment for Producing Continuous Vinyl Foam Includes *(Top Photo)* Mixing and Foaming Unit, and *(Bottom)* Conveyor with Dielectric Curing Unit**

## Continuous Vinyl Foam

SOFT vinyl foam is produced continuously, and can be cured directly on to textiles and other materials in continuous sheets, by a new process developed by Elastomer Chemical Corp., Newark, N. J. Employing plastisols based on Bakelite vinyl resins, the process requires equipment costing less than one-sixth that needed for producing foam rubber, yet gives a product that can be fabricated at comparable costs, it is claimed.

Highly resilient and elastic, the processed vinyl foam is practically odorless and is resistant to oxidation and hardening, flame, moisture, alkalies, acids, and abrasion. Foam densities can be produced varying from 6-30 pounds per cubic foot in almost any degree of hardness. Easily controlled variations in the plastisol formulation or in the foaming and molding techniques provide changes in the tear strength, elongation, chemical resistance, and other properties of the foam to meet requirements.

Continuous foaming equipment (see accompanying illustration) mechanically mixes the plastisol with a gas after they have been metered accurately and simultaneously into the mixing head. Depending on the density desired, production rates from 150-350 pounds an hour can be achieved with an average-size foamer; while larger units can produce up to 1,000 pounds an hour. Increased gas retention, which lowers the foam density, is obtained by cooling the mixture in the mixing head with ammonia from a compression cooling system. Expanded foam can be discharged continuously through a hose and nozzle either into open or closed molds or directly on to conveyor belts where it can be cured rapidly in sheet form with dielectric heaters. For example, a 30-foot long conveyor belt uses a five-kilowatt dielectric heater to cure continuous sheeting ¼-inch thick and 14 inches wide at the rate of three feet a minute (see illustration).

Equipment can be made to cure the foam either continuously or in stationary molds at almost any desired rate or thickness in widths up to 60 inches. Continuously cured foam sheet can be molded directly to natural or synthetic textiles, or to vinyl film or sheeting to provide a resilient cushion backing. The foamed plastisol is said to cure at about 250° F. without shrinkage in the mold or the need of mold release agents.

## Discuss Vinyl Weathering

AN INTERESTING talk on "Weathering Properties of Vinyl Plastics," by John G. Hendricks, National Lead Co., featured the January 19 meeting of the Elastomer & Plastics Group, Northeastern Section, American Chemical Society. Approximately 50 members and guests attended the meeting, which took place at Massachusetts Institute of Technology, Cambridge, Mass., and followed an informal dinner at Smith House.

Using many slides to illustrate his talk, Mr. Hendricks discussed his company's work in correlating physical properties of vinyl samples after natural aging with those after accelerated aging tests. Basic studies of weathering resistance indicate that all components of the plastic compound have an effect on aging and require careful selection. Resin selection is important, since homopolymers generally have better weathering resistance than do copolymers and pastes. Processing temperature is another critical factor and must be high enough to insure complete fusion of the resin.

Plasticizer selection is a major factor, the speaker noted. Weathering resistance requires a balancing of low-temperature flexibility and volatility, as well as light stability of plasticizers. Studies show that ether groups and aliphatic unsaturation promote early failure through cross-linking; while aryl phosphates and benzyl esters tend to cause rapid discoloration of the plastic upon exposure to light. Selected alkyl phthalates and alkyl esters of aliphatic acids impart properties most suitable for outdoor applications. Precautions to observe in mixing plasticizers were also enumerated by the speaker, who also emphasized the danger of interpolating plasticizer data from insufficient samples.

Mr. Hendricks noted that the choice of effective stabilizers is relatively limited to selected barium-cadmium-organics, tin salts, dibasic lead phosphite, and sodium salts in order of increasing sunlight resistance. The weathering resistance of sodium salts, however, is limited by reactivity and absorption of water. Fillers are often beneficial for developing certain qualities, as well as for economic reasons. Uncoated whiting is generally innocuous, but most fillers, especially silicates, impair weathering resistance to some degree. The effective absorption of ultra-violet light by carbon black and rutile titanium dioxide enables these pigments to improve markedly the weathering life of plastics.

The speaker concluded his talk with a discussion of equipment used in weathering tests, pointing out that none duplicates exactly the results obtained with natural aging. The most reliable results appear to be produced with a standard Fade-Ometer

*(Continued on page 633)*

# Scientific and Technical Activities

## Akron Group and Local SPE Section Symposium on Resin-Rubber Blends—II*

### Blends of Styrene-Acrylonitrile Resins with Rubbers

**Willard de Camp Crater**[1]

THE plastics industry, although far from new, like its big brother, rubber, is growing up very fast. The Paley Report,[2] based on studies made by Standard Oil, Stanford Research, National Production Authority, and others, shows a growth rate from 2.4 billion pounds in 1950 to more than 22 billion pounds by 1975 for all plastics. A large percentage of this increase is predicated on the present and the development of new resin and rubber blends with improved characteristics.

Styrene monomer, thanks in part to the synthetic rubber industry, is available at a reasonable price. Polystyrene has a combination of valuable properties and has had a very fast growth rate since 1944. Its deficiencies include brittleness and relatively low softening temperature. To overcome these undesirable properties other monomers, such as acrylonitrile, used in the manufacture of oil-resistant synthetic rubber, were chosen for copolymerization with styrene. These copolymers have found commercial use and have better solvent resistance, heat distortion, and impact than polystyrene. These polymers, however, lack the toughness on high impact desirable for many applications.

Combinations of styrene-acrylonitrile resins and butadiene-acrylonitrile rubbers provide a marked increase in toughness with little sacrifice in hardness and heat distortion of the unmodified resin. Of the various rubbers evaluated with the styrene-acrylonitrile resin, butadiene-acrylonitrile has established the desirability of this particular blend.

#### Properties of Blends

The ratio of nitrile in the resin-rubber and the ratio of the resin to rubber in the final mixture are but primary variations, and a multitude of secondary variations can be imposed on this already flexible system. Although the system appears simple, in reality it is complex. To obtain both desirable and maximum mechanical characteristics it has been found necessary to tailor make the individual resins and rubbers used in the blends. The series of available molding and extrusion compounds feature: (1) toughness and good rigidity; (2) dimensional stability; (3) decorativeness and functionality; (4) easy formability; (5) chemical and strain resistance; (6) good electrical properties; (7) low specific gravity; (8) versatility.

To be more specific, individual blends with high hardness exhibit notched Izod impact strengths of 8 ft. lbs./in., with a corresponding value of about 40 ft. lbs./in. for the unnotched Charpy impact at room temperature. New relatively hard blends retain toughness, with virtually no loss down to —40° F. and with only a moderate decrease at temperatures down to —60° F. This new material seems unique since the impact values over the entire temperature range are appreciably higher than for other available thermoplastics of equivalent hardness and rigidity. The Izod impact values are between 6 and 7 ft. lbs./in. from —40 to 90° F. and are still above 4 ft. lbs./in. at —60° F.

Since it is not necessary to use monomeric plasticizers in the resin-rubber blends, they exhibit excellent dimensional stability at high humidities and at low and high temperatures. As would be expected, the resistance to oils, fats, chemicals, and gasoline is good. The bursting strength frequently correlated with so-called effective tensile strength is superior to many other plastics. This combination of properties is extremely useful for such end-products as pipe handling many types of corrosive materials.

One disadvantage is the fact that the blends are opaque and cannot be used where transparency is required. A full range of colors, however, can be obtained for most applications.

#### Mixing and Processing

Preparation of the molding powders based on the styrene-acrylonitrile and butadiene-acrylonitrile blends has been accomplished in conventional and special mixing equipment. The process may start with latex blending or coprecipitation. As previously stated, besides the selection of the proper grades of resin and rubber, control of mixing (temperatures, cycles, and method of addition) is very important to achieve the maximum properties of the blends. Impact, for example, can be drastically affected by mixing, and years of factory experimentation were required to achieve the quality of molding powder now sold.

The blends are processed into numerous products by calendering, molding, and extrusion. The fact that these blends do not have a sharp or critical softening point in many applications is a distinct advantage. For example, in the processing of large-diameter pipe it is much easier to control dimensions, and the cooling and sizing equipment can be simplified.

#### Applications

Applications for the blends or the plastalloys, as they are frequently called, include golf club heads, molded helmets, carrying cases, molded cams, gears, pipe, pipe fittings, chair parts, door knobs, shower and spray nozzles, floats, valve parts, machine housings, and small machinery parts replacing metals, molded caps, bobbins, spools, quills, automotive applications, duct work, and foamed parts.

In summation, thermoplastics obtained from styrene-acrylonitrile resin and butadiene-acrylonitrile blends have high impact strength combined with good hardness and rigidity. The discussion has been limited to a single system which gives a high order of toughness and includes a compound with excellent low-temperature properties, but the same principles should apply to other resin-rubber systems. Both suppliers and molders are evidencing growing interest in such combinations, which promises that future developments in rigid thermoplastics will include wider use of resin-rubber blends.

#### Questions and Answers

**Q. What are the recommended mixing temperatures for best properties of butadiene-styrene and acrylonitrile-styrene resins in rubbers?**

**A.** If a blend of butadiene-acrylonitrile and vinyl resins is mixed at too low a temperature, such as 200° F., the vinyl resin does not go in solution and merely acts as a filler. The mixing temperature is predicated on the molecular weight of the individual resin and rubbers used in the blend, and in the foregoing example, temperatures in excess of 300° F. are generally required. Acrylonitrile-styrene resins are generally mixed with nitrile rubbers at temperatures between 330 and 370° F.

**Q. What combinations of vinyls and other resins can be used for the manufacture of garden hose?**

**A.** Combinations of vinyl resins and nitrile rubbers are excellent compounds for subsequent extrusion into garden hose, wire and cable coverings, and for numerous other applications. These combinations can be further plasticized with either monomeric or polymeric type of plasticizer. For specific applications, much higher loadings can be used in the vinyl nitrile blends than with compounds based on a mixture of vinyl resin and plasticizer only. Despite the cost of the rubber, low-cost stocks are possible.

**Q. What are the economics of using the rigid thermoplastic resin-rubber blends in comparison with other thermoplastics? Can soft vinyl nitrile blends compete with other rubber compounds?**

**A.** Prior to considering price, the end-use requirements must be considered, and the proper material chosen to do the job at the most economical price. In addition to the price of the molding powder, its grav-

* Continued from our January issue.

[1] Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

[2] "Resources for Freedom." The President's Materials Policy Commission, June, 1952. United States Government Printing Office, Washington, D.C.

ity, and also the possibility of reengineering the part, to use less material must be considered. The hard thermoplastic butadiene-acrylonitrile and styrene-acrylonitrile blends in molding powder form are sold for approximately 58 to 65¢ a pound—gravity approximately 1.05. For specific applications such as pipe, other materials, such as polyethylene and the styrene copolymer molding powders, are less expensive in raw material form. In general, the resin-rubber blends have a lower pound volume cost than the cellulosic materials used for this same application. The mechanical advantages of the resin-rubber blends, such as higher bursting strength or effective tensile strength, often allow the use of thinner wall pipe, thus making it more economical than many materials for specific uses.

In the past two years several rubber parts have been replaced with vinyl or thermoplastic-resin-rubber blends. Since the raw material cost of the thermoplastics is generally considerably higher than for either new or reclaimed rubber stocks, processing, labor involved, and reengineering of the part are necessary to achieve lower cost. An example of this point is an injection molded vinyl armrest covering used by one of the automotive companies about two years ago. Since the part could be manufactured at higher speeds with less labor and had been engineered to use less material, it was more than competitive with its rubber counterpart.

**Q. Which of the rubber-resin blends gives the best resistance to 15% nitric acid at 140 and 200° F?**

**A. Crater.** The butadiene-acrylonitrile styrene blends, or Kralastic, immersed in 25% nitric acid for one week at 74° F. loses approximately 0.5%. Marvinol NR-7045 and unplasticized polyvinyl chloride show no change in weight after 30 days in 25% nitric acid at 74° F., and a slight gain of 0.2% in weight after seven days in 25% nitric acid at 158° F.

**A. Bascom.** Although PVC nitrile rubbers and phenolic resins are all quite resistant to volume change and degradation in 15% nitric acid at 145° F., any blends of these would be quite serviceable. At 200° F., however, it would probably be desirable to use a thermoset blend; therefore, we would suggest a blend of nitrile rubber and phenolic resin or a blend of nitrile rubber and the styrene-acrylonitrile copolymer. In any case, the blend should probably be thermoset.

**A. Smith.** We are not very familiar with exposures of nitrile rubber-vinyl chloride blends to 15% nitric acid. Rigid, unplasticized PVC has excellent resistance to such exposures, but nitrile rubber itself is known to have poor resistance to dilute or concentrated nitric acid. I would expect that addition of nitrile rubber to the vinyl chloride would give an unsuitable product except with very low percentages of the rubber. Below 10% it might be all right.

At 200° F., however, the resistance is well above the softening point of even rigid PVC compounds, and there is no combination with rubber which we would expect to be suitable at this temperature.

# Blends of Phenolic Resins with Rubber

R. C. Bascom[1]

MY ASSIGNMENT today is blends of phenolic resins with rubbers, and in this short introduction I propose to discuss in a very general way the characteristics, preparation, methods of processing, and applications of such blends. In the question and the answer period which follows more discussion will be given to specific problems.

## Phenolic Resin Characteristics

Phenolic resins are the products of a condensation reaction between aldehydes, usually formaldehyde, and phenols. Phenols commonly used are normal phenol, cresol, and specially modified phenols. When a phenol and an aldehyde are reacted together, and the reaction is permitted to go to completion, a hard, strong resinous material is produced. If, however, the reaction is stopped short of completion, the resinous product may be of any desired molecular weight and physical state. The product may be a liquid or a solid, but is usually thermoplastic. The reaction may be stopped by interrupting its course, or it may be stopped by using a lower amount of formaldehyde than would be required to complete the reaction to a hard resinous product.

The product of this second type of reaction is the common type of phenolic resin used in the industry. In order to use this particular product it is necessary to add an activator, usually in the form of hexamethylene tetramine, which reacts with the partially converted resinous material to form a complex mass polymer with a great deal of strength.

Fillers and lubricants are usually added at the same time that the "hexa" is added to this resin. This adding is done by dry blending the powdered resin with the other ingredients, followed by a hot milling operation which serves two purposes: (1) the resin is fluxed to form a continuous phase of resin around the filler particles; and (2) the resin-"hexa" reaction is started, and the resin is advanced toward its final cure.

I have gone into detail on this operation because, although it is well known, many people tend to forget that the resin reaction is irreversible and progressive. That is, each time the resin is heated, it advances toward its final cure. Compounders who are used to processing rubber are sometimes surprised by the scorchy nature of phenolic blends.

Because molded parts made with the phenolic resin are inherently brittle and yet very strong, consumers and manufacturers of phenolic resins and manufacturers of rubber parts have been trying for a long time to make combinations of rubbers and phenolic resins. Phenolic resins and most rubbers are inherently not compatible. However, the advent of nitrile rubbers which are inherently compatible made practical, useful blends of rubbers and resins.

Most phenolic resins have a degree of compatibility with all nitrile type rubbers. This compatibility is especially evident in the uncured state, and such blends made on a rubber mill show a nice uniform smooth rolling bank and a translucent sheet. This very wide range of compatibility, however, seems limited to the uncured state, and there is considerable interference with the cure or condensation reaction of the phenolic resin. Accordingly, the most useful cured blends of phenolic resins and nitrile rubbers are made with highly modified resins, which are available from nearly all the major phenolic resin manufacturers, and nitrile rubbers with acrylonitrile content on the order of 40%. With these limitations, useful blends of nitrile rubbers and phenolic resins can be made over the whole range. Relatively small amounts of phenolic resin will reinforce the rubber to give a tough cured sheet without supplementary filler or vulcanizing agents; while a small amount of rubber will reduce the brittleness of the phenolic resin and produces a product which is quite tough.

## Preparation and Properties of Blends

The physical properties of such blends are nearly as one would expect. The rubber increases elongation and impact strength of the phenolic resins while it lowers hardness and tensile strength. The resin, on the other hand, increases the tensile strength and hardness and in general reinforces the rubber. Although special resins and rubbers are required to get a wide range of compatibility, certain applications can tolerate blends with less compatibility. For instance, a highly modified resin will reinforce shoe soles when GR-S is used even though there is not good compatibility in this particular case, and small amounts of nitrile rubbers can be used to modify even conventional phenolic resins.

A discussion of preparation and processing of these blends must be broken down into the type of end-application or industry. When these blends are used as adhesives, they may be blended in aqueous media solvent solution or as adhesive film. For instance, the resorcinol formaldehyde latex type of adhesive for tire cord. Nitrile latex is very often blended with phenolic resins in dispersion to produce an adhesive useful for flocking cement, wood glues, and for other high-strength adhesive applications. In aqueous blends it is important that the phenolic resin be a dispersion rather than a solution because free alcohols or phenols usually present in the phenolic solution cause the nitrile latex to coagulate. Blends of nitrile latex and phenolic resin are sometimes incorporated in wet process addition in paper for lamination into sheet material.

Solvent solutions for use as adhesives are prepared by adding soluble phenolic resins to solutions of nitrile rubber compounds. Adhesive film for use in bonding automotive brake shoes to bands are prepared by calendering suitable dry, mixed blends of rubber and resin. The film has thermoplastic adhesive qualities, and strong bonds are obtained by curing an assembly under pressure.

In the rubber industry when phenolic resins are used to reinforce nitrile rubbers, the resin is added as part of the filler in the conventional method of mixing for rubber products. The resin produces an uncured rubber compound rather difficult to manage. It is thermoplastic, very boardy and rather stiff; when it is hot, it tends to stick, and it tends to be rather scorchy.

When a small amount of nitrile rubber is used to modify a phenolic molding compound, the rubber is added in the conventional phenolic mixing cycle as a powder

[1] B. F. Goodrich Chemical Co., Cleveland, O.

to the powdered resin and fillers. The resultant powder mix is then fluxed on a mill for a very short time and then granulated. Although these operations are performed on conventional machinery for each industry, problems are introduced which were at first very troublesome. The resulting uncured compound is considerably tougher and stronger than the conventional phenolic mix. The problem of granulation of this mix is considerably more difficult than the granulation of a conventional phenolic molding compound. The rubber modified-phenolic resin molding compound usually cured a little slower than the conventional phenolic and in most cases has considerably more flow. However, because of the unusual characteristics of blends of phenolic resins and nitrile rubbers, difficulties in processing are overcome, and such blends are in rather wide use.

## Applications

Applications of these blends cover such a broad industrial scope that it is impossible to cover them all. Accordingly, I will only mention a very few. First is the use of phenolic resin to modify nitrile rubber in shoe holders for a sole cementing machine. This piece made from tire cord-filled natural rubber compound will completely wear out after six weeks of use. The same piece made from a phenolic resin modified nitrile rubber will be in excellent condition and still serviceable after 1½ years of wear.

I had previously mentioned the use of a highly modified phenolic resin to supplement high-styrene resins in reinforcement of shoe sole compounds. This resin is useful in such compounds because it produces a more rigid, less thermoplastic shoe sole which has excellent resistance to deformation at a slight sacrifice in flex life. Such a shoe sole modified with a combination of phenolic resin and high-styrene resin is useful on women's inexpensive shoes where inadequate filling is placed between the uppers and the mid-sole. A normal high-quality styrene resin reinforced shoe sole will tend to deform in operation and show ridges caused by poor shoe manufacture. The more rigid phenolic reinforced sole, on the other hand, will bridge over these ridges and retain a smooth surface.

Adhesives made from nitrile rubbers and phenolic resins are useful in a great many applications. They adhere well to almost all materials except polyethylene, butyl, and natural rubber. They are used for such high strength applications as the adhesion of brake bands to brake shoes for automotive brakes and for the adhesion of shoe soles to uppers in the manufacture of shoes, and, of course, they have a whole wide range of applications in between these two extremes.

Harder molded parts made usually in phenolic molding plants utilize relatively small amounts of nitrile rubber to produce products which are hard, yet tough; strong and yet not brittle. Parts made from these compounds are used for three major reasons: first, thin sheets of the material can be cured and parts can be punched from the sheets without fracture; second, large and complicated inserts can be molded into a part without danger of cracking from thermal expansion or contraction; third, high impact strength can be achieved using fillers normally considered of low impact strength in conventional compounds. Thus a wood flour or asbestos loaded nitrile rubber phenolic compound would have the impact strength of a flock or fabric filled material. This advantage is a decided one since larger sized filling materials in phenolic molding compounds increase the cost and difficulty of molding by a great deal; further, cellulosic materials used as filling for phenolic compounds tend to have relatively poor water resistance and correspondingly poor electrical properties. The use of mineral filled nitrile rubber modified phenolic molding compounds permits manufacture of parts which have exceptionally good electrical properties and physical properties.

In conclusion I would like to point out that these blends offer compounding tools to both the rubber compounder and to the phenolic resin compounder. These blends permit the use of phenolic resins in applications where conventional phenolic molding compounds could not be used and thus expand the market for both the nitrile rubber and the phenolic resins. These blends were created because there was a definite need of compounds with the physical properties made possible by the blends, and we are quite sure that future blends will be created as the necessity for them develops.

## Questions and Answers

**Q. In a phenolic resin-polymer blend do you have any suggestions for cross-linking the resin and curing the rubber in separate stages or at different temperatures?**

**A.** In my opinion it would be extremely difficult to develop a blend in which the resin was cross-linked or cured at a different time or temperature than the curing of the rubber in the blend. Several factors would influence such an attempt. The major one would be the fact that the "hexa" used in curing the resin acts as an activator for the rubber phase. There is even a possibility that the more desirable properties obtained from blends of phenolic resins and rubbers depend on mutual curing ability. Certainly this is true in the use of phenolic resin or phenolic resin-rubber blends as adhesives for nitrile rubbers. If the curing systems of the adhesive and the rubber are not at about the same rate and at about the same temperature, very poor adhesion results.

**Q. Why is it that cures are adversely affected when a phenolic resin is added to a rubber compound?**

**A.** When phenolic resins are added to nitrile rubber compounds, most of the time the cures are accelerated so that the compounds are quite scorchy. I can only conclude that this question referred to the addition of either phenolic resins which are not compatible to nitrile rubbers or to other rubbers in which there is no compatibility. In this case the phenolic resin acts as a very coarse and very poor filler for the compound and would contribute nothing to the end-results other than a degree of mushiness.

**Q. Frequently blends of acrylonitrile polymers and phenolic resins are inclined to be scorchy. Is it possible to improve this characteristic by the use of retarders which are normally effective in rubber stocks, or are there other materials which might be used to improve scorch?**

**A.** While I do not know of any retarders that effectively prevent the scorchiness, it is possible to obtain from the resin manufacturers resins compatible with nitrile rubbers that contain either no "hexa" or half as much "hexa" as in the normally used phenolic resins. Thus the resins which have little or no "hexa" in them are considerably less scorchy and make compounds considerably less scorchy than the regularly used resin. However, the absence of "hexa" from the compound certainly does not make as good a stock as if the "hexa" were present; therefore, my best solution to this problem is the use of phenolic molding techniques in order to handle such blends, rather than rubber processing techniques. That is, I would make a compound, mix it in whatever way one desired, sheet it out as thin as possible, and then granulate the compound. This granulated compound can then be molded in the same way that the phenolic molding compounds are molded. This method avoids putting a great deal of heat history into the phenolic and means that the compounds can be handled without any difficulty.

**Q. What are the governing factors of compatibility when it is desired to blend phenolic resins with straight PVC resins when: (1) plasticizer content (TCP) is low (ca. 5-10 phr); (2) plasticizer content (TCP) is high (ca. 60-80 phr); (3) plasticizer content is comprised of polymeric and D.O.P. and quantity is average (ca. 20-40 phr)?**

**A.** PVC resins and phenolic resins have approximately the same compatibility characteristics as do nitrile rubbers and phenolic resins. This inherent factor of compatibility is not particularly influenced by the plasticizer content although generally a liquid ester type of plasticizer is not very good in a phenolic system. Therefore a polymeric or a rubber-type plasticizer would be preferred in such a blend. A very serious limiting factor in the usefulness of PVC phenolic resins is the fact that phenolic resins normally cure with the evolution of gas both from the decomposition of the "hexa" and from the water formed during the condensation reaction between the formaldehyde and the phenolic. This gas formed during cure means that the blend is very difficult to cure in open air or steam. However, such blends can readily be cured in presses or closed molds.

**Q. The companies manufacturing phenolic resins have materials which are claimed to be very compatible with GR-S and natural rubber. Can you give us any information on the compounding and processing problems with these blends and the extent to which they are finding usage in the industry?**

**A.** Certain phenolic resins are compatible with GR-S and natural rubber in that they cure together without interfering with the cure of either component. However, when these resins are used in shoe sole compounding, they contribute only to the hardness of the compound and have an adverse effect on flex life. Accordingly, it is my impression that these are used in combination with high-styrene resins for reinforcement of shoe soles and are rarely used to an extent larger than 50% of the total resin reinforcement. I believe also that such combination resin reinforcement systems are used only in inexpensive or cheap shoe soles.

**Q. What lubricants are best for mold release of a nitrile rubber, reclaimed rubber, phenolic resin compound loaded with 300 parts of clay when cured to a Shore Type D hardness of 65 to 75, when used on a deep draw product?**

**A.** Because nitrile rubber-phenolic resin compounds are inherently good adhesives, it is necessary to add lubricants to the compound in order to prevent adhesion to the mold. Such materials as high stearic acid, high paraffin or lithium stearates, or other lithium waxes, or combinations of these are very valuable in the compound. Enough should be added so that you get a slight bloom after cure. If additional lubricant is required in order to free the part from the mold, especially on a deep draw product, it might be desirable to use a silicone-type mold lubricant, many of which are available from many suppliers.

*(To be concluded)*

## Safety in the Rubber Industry—NSC Meeting

THE accident frequency rate[1] of the rubber industry for 1952 was 29% less than the rate for all industries combined, but was 0.84% greater than that for 1951. At the same time 1952 saw recorded a frequency rate of 5.08 for those rubber companies entered in the Rubber Section Safety Contest, National Safety Council, a 12% decrease from the rate of the previous year. An even smaller rate is expected in 1953 on the basis of data which are available for the first six months of that year.

The statistics from which the above conclusions were drawn and awards made to the various rubber companies with the best records were presented before the Rubber Section of the NSC at its annual meeting in the Conrad Hilton Hotel, Chicago, Ill., by W. J. Dooling, Hood Rubber Co., chairman of the Section's statistical committee. The conference, held October 20-21 as part of the National Safety Congress, also heard addresses and symposia on the promotion of safety in the plants of the rubber industry.

A recent report from the Department of Labor places injury frequency rates for the first six months of 1953 at 3.1 for the synthetic rubber industry and at 3.3 for rubber footwear plants. Figures recently released by the Rubber Section, NSC, give an average frequency rate of 4.45 for the first 10 months of 1953. This 4.45 rate is presumably an average of the rates of those companies entered in the Section's contest and represents a 2% reduction over the figure recorded for the same period for 1952.

Mr. Dooling advised the gathering that their industry stands tenth behind the industry with the greatest frequency and severity rates. The following data from *Accident Facts* show the position of the rubber industry in comparison with other fields:

| | 1951 | 1952 |
|---|---|---|
| All Industries | | |
| Frequency rate | 9.06 | 8.40 |
| Severity rate | 0.97 | 0.88 |
| Rubber Industry | | |
| Frequency rate | 5.91 | 5.96 |
| Severity rate | 0.36 | 0.42 |

Awards were made to rubber company plants on the basis of their frequency rate and their classification as to size. Such honors and the accompanying statistics were carried in the May, 1953, issue of India RUBBER WORLD.[2]

By means of introduction for the following two papers, T. J. Cain, The B. F. Goodrich Co., spoke on **"What Are We Doing to Prevent Windup and Let-Off Accidents—Production Presents Their Side of the Story."** The discussion at the 1946 conference of the Section regarding the lack of standardization in equipment was recalled as precipitating a meeting of design engineers from various companies. Agreement on general safety design features for the rolls and general information on equipment resulted from this meeting; the latter information was compiled into a NSC publication, Data Sheet D-RU3, 1952.

**"The Engineer's Approach to Safer Windups"** was the subject of a paper by R. F. Snyder, Goodyear Tire & Rubber Co. Some of the safety devices developed by Goodyear were described. The use of electronic instruments, designed for particular applications by electronic and mechanical engineers, has been found to be the most satisfactory to provide automatic, failure-proof, tamper-proof, and dependable protection at a reasonable cost.

**"Safety Mechanical Guards Have Their Places,"** an address by N. H. Rinehart, United States Rubber Co., dealt with methods of minimizing exposure of personnel to accidents by use of automatic and semi-automatic machines, isolation with sectional fences, enclosure with removable-disconnect guards, use of pneumatic feeds, etc.

Round-table discussions were then held on safety in the fields of mechanical goods, tires, synthetic rubber, and reclaimed rubber. The mechanical goods session, presided over by N. C. Longee, U. S. Rubber, considered the problems of safe installation of extrusion and vulcanization units; of guarding punch-press trimming operations on molded goods, including multiple-deck presses; of inspection of hoists; and of educating the employe on how and how much to lift, reporting accidents, etc.

The tire symposium was headed by H. L. Andrews, Firestone Tire & Rubber Co., and discussed problems involved with continuous run-buttons on semi-automatic machines; spinner bars; Bag-O-Matic presses; mold breakage; post-cementing operations; etc.

In the discussion on synthetic rubber, presided over by F. T. Reynolds, of the Government Laboratory, University of Akron, the following subjects were covered: eye protection; safety training for new personnel; vessel entry procedure; fire prevention; and housekeeping.

The last symposium, moderated by M. R. Batche, of Xylos Rubber Co., dealt with reclaimed rubber. Discussed here were the subjects of eye protection, toe protection, fire prevention, analysis of injuries, discussion of injuries with supervisory personnel, and the value of safety contests.

### Rubber Section Elections

The executive committee of the Rubber Section, at its meeting in Chicago, voted to include representation from synthetic rubber plants, rubber laboratories, mechanical goods plants, and reclaimed rubber plants.

R. W. Fickes, of Goodyear, was elected general chairman of the Section. Vice chairman in charge of program is T. J. Cain, Jr., Goodrich; and secretary is W. M. Graff, U. S. Rubber. The editor of the Section's *News Letter* is J. L. Dean, Firestone.

Chairmen of the various committees follow: engineering, A. R. Pomeroy, Ohio Rubber Co.; trade association liaison, J. J. Raytkwich, U. S. Rubber; health, Dr. R. H. Wilson, Goodrich; membership, F. W. Sands, U. S. Rubber; publicity, Mr. Dooling; rules and regulations, G. D. Cross, Firestone; poster, C. S. Kruger, Carlisle Tire & Rubber Division, Carlisle Corp.; and statistics, S. A. Wright, Inland Mfg. Division, General Motors Corp.

### New Record by Firestone

A new record in industrial safety—7,103,472 man-hours worked without a lost-time accident—has been set by the Memphis, Tenn., tire plant of Firestone Tire & Rubber Co. over the period from February 23 to December 24, 1953. The company, which had received NSC's highest citation, the Award of Honor, for the seventh time in 1952 for a record accident frequency rate in all plants of 1.8, had also set the previous record for time worked without a lost-time accident with almost 6,500,000 man-hours.

[1] Disabling injuries per 1,000,000 man-hours worked.
[2] P. 236.

## Butyl Rubber Inventor Honored

THE 1954 Gold Medal of the American Institute of Chemists will be presented to William J. Sparks, co-inventor of Butyl synthetic rubber, at the Institute's annual meeting in Asbury Park, N. J., in May. The twenty-sixth person chosen for the annual award, Dr. Sparks is credited with playing a key role in the development of the isobutylene-isoprene low-temperature copolymer, a material from which most inner tubes are now made. He is presently employed by Standard Oil Development Co., the firm with which he conducted much of the research leading to the development of Butyl, as director of the chemical division and coordinator of exploratory research.

## Los Angeles Group Party

THE annual Christmas party of The Los Angeles Rubber Group, Inc., took place December 4 in the Cocoanut Grove of the Ambassador Hotel, Los Angeles, Calif. Approximately 700 members, guests, and their wives attended the affair, which included a steak or lobster dinner and an evening of dancing. Arrangements for the successful party were handled by F. C. Johnston, Caram Mfg. Co.

New officers and directors of the Group were introduced by R. L. Short, Kirkhill Rubber Co., as follows: chairman, L. E. Budnick, Ohio Rubber Co.; associate chairman, Mr. Johnston; vice chairman, C. S. Hoglund, R. D. Abbott Co.; secretary, A. H. Federico, C. P. Hall Co. of California; treasurer, W. M. Anderson, Gross Mfg. Co.; and directors, T. W. Andrews, H. M. Royal, Inc., W. A. Fairclough, Naugatuck Chemical Division of United States Rubber Co., D. C. Maddy, Harwick Standard Chemical Co. of California, and B. R. Snyder, R. T. Vanderbilt Co., Inc.

## Peroxide from Gum Turpentine

A PROCESS for the production from gum turpentine of pinane hydroperoxide, a chemical that has been successfully used as a polymerization catalyst for cold synthetic rubber,[1] has been developed by the United States Department of Agriculture. The result of several years of research at the Naval Stores Station, Olustee, Fla., the new process is reported to be simple, rapid, and economically feasible. Application of the chemical as a substitute for cumene hydroperoxide in cold rubber polymerization makes probable its successful use in the same capacity in synthetic resins and plastics.

Conversion of 50% of the raw material into peroxides containing 80-90% pure cis-1-pinane 2-hydroperoxide are reported by the discoverers of the process.[2] Pinane, obtained from the hydrogenation of turpentine, is purified, usually by simple distillation, and oxidized with molecular oxygen to a peroxide content of about 50%. The final step in the process is the stripping, under vacuum, of this peroxides-pinane mixture to obtain a separation.

[1] "Peroxides from Turpentine as Catalysts for 5° C. GR-S Polymerization." G. S. Fisher, I. Kneil, A. D. Snyder, *Ind. Eng. Chem.*, 43, 3, 671 (1951).
[2] "Peroxides from Turpentine. II. Pinane Hydroperoxide." G. S. Fisher, J. S. Stinson, L. A. Goldblatt, *J. Am. Chem. Soc.*, 75, 3675 (1953).

## Thiophenol Available

EVANS CHEMETICS, INC., New York, N. Y., has announced the availability in semi-commercial quantities of thiophenol ($C_6H_5SH$) for use in stabilizing polysulfone resins, in plasticizing crude rubber, in enhancing the millability of butadiene interpolymers, and as polymerization regulators. The physical properties given for the chemical include: boiling point, 169.5° C.; specific gravity, 1.075; color, water-white; and purity, 99%.

## Williams Discusses Compounding

A TALK on "The Ways of Compounding" by Ira Williams, J. M. Huber Corp., featured the November 6 dinner-meeting of the Chicago Rubber Group, Inc., held at the Furniture Club, Chicago, Ill. Dr. Williams dealt mainly with the functions of oils, softeners, and solid compounding ingredients. Emphasis was placed on the need of the compounder to know the function of each ingredient and to use no more ingredients than required.

In the business session preceding the talk, it was announced that A. W. Hawkins, Jr., E. I. du Pont de Nemours & Co., Inc., had been forced to resign as Group chairman because of a job transfer. The other officers have been moved up to fill the vacancy, as follows: chairman, Stephen M. Lillis, Victor Gasket & Mfg. Co.; vice chairman, A. L. Robinson, Harwick Standard Chemical Co.; secretary, L. W. Heide, Acadian Synthetic Products Division, Western Felt Works; and treasurer, A. E. Laurence, Phillips Chemical Co.

## Byam Compares Neoprenes

A TALK on "Interrelation of the Various Types of Neoprenes," by Seward Byam, E. I. du Pont de Nemours & Co., Inc., highlighted the December 16 meeting of the Washington Rubber Group, held in the auditorium of the Potomac Electric Power Co. Bldg., Washington, D. C. As an innovation, the meeting also included a Christmas social session following the talk, at which refreshments and token door prizes were distributed.

Mr. Byam began with a brief comparison of neoprene, GR-S, and natural rubber, pointing out that, except for quality higher in most properties than those of other rubbers, neoprene could be called an all-purpose rubber. The speaker then described the different types of neoprenes and their applications. Types GN, GNA, GRT, W, WHV, and WRT are general-purpose rubbers; while Types CG, AC, KNR, S, FR, and Q are special-purpose polymers.

Type WHV is a new neoprene modified from Type W (Mooney 42-54) to have a Mooney plasticity of 110-135 and can be extended with large amounts of oil to make economical compounds. In addition to general uses, Type WHV is recommended to replace Type S as a stiffener in GN or W stocks because it is more processable in blends.

Estimates of total new rubber consumption in this country in 1953 indicate that 60,000 tons of neoprene were used, amounting to 4.5% of the total. The speaker noted that estimates for 1957 call for the consumption of 88,000 tons of neoprene, or 6% of total new rubber.

## CALENDAR

| | | |
|---|---|---|
| Feb. | 17. | New York Section, SPE. Hotel Gotham, New York, N. Y. Washington Rubber Group. |
| Mar. | 2. | The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif. |
| Mar. | 4. | Northern California Rubber Group. |
| Mar. | 10. | Newark Section, SPE. Military Park Hotel, Newark, N. J. |
| Mar. | 17. | New York Section, SPE. Hotel Gotham, New York, N. Y. Washington Rubber Group. |
| Mar. | 18-20. | Division of High Polymer Physics, APS. Detroit and Ann Arbor, Mich. |
| Mar. | 22-24. | Committees D-9 and D-20, ASTM. Roanoke Hotel, Roanoke, Va. |
| Mar. | 25. | Southern Ohio Rubber Group. Symposium on Synthetic Rubber Polymerization. Engineers Club, Dayton, O. |
| Mar. | 26. | Boston Rubber Group. Spring Meeting. Chicago Rubber Group, Inc. Furniture Club, Chicago, Ill. |
| Apr. | 2. | Akron Rubber Group. Mayflower Hotel, Akron, O. |
| Apr. | 6. | The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif. |
| Apr. | 8. | Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind. Northern California Rubber Group. |
| Apr. | 9. | Detroit Rubber & Plastics Group, Inc. Detroit LeLand Hotel, Detroit, Mich. |
| Apr. | 14. | Newark Section, SPE. Military Park Hotel, Newark, N. J. |
| Apr. | 14-16. | Division of Rubber Chemistry, A. C. S. Brown Hotel, Louisville, Ky. |
| Apr. | 21. | New York Section, SPE. Hotel Gotham, New York, N. Y. Washington Rubber Group. |
| Apr. | 30. | Chicago Rubber Group, Inc. Furniture Club, Chicago, Ill. |
| May | 4. | The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif. |
| May | 6. | Northern California Rubber Group. |
| May | 12. | Newark Section, SPE. Military Park Hotel, Newark, N. J. |
| May | 14. | Connecticut Rubber Group. |
| May | 17-20. | Second Basic Materials Exposition and Conference. International Amphitheatre, Chicago, Ill. |
| May | 19. | New York Section, SPE. Hotel Gotham, New York, N. Y. Washington Rubber Group. |
| June | 5. | Southern Ohio Rubber Group. Summer Outing. |
| June | 9. | Newark Section, SPE. Military Park Hotel, Newark, N. J. |
| June | 11. | Fort Wayne Rubber & Plastics Group. Summer Outing. |
| June | 12-13. | The Los Angeles Rubber Group, Inc. Summer Outing. Hotel Miramar, Santa Barbara, Calif. |
| June | 14-18. | American Society for Testing Materials. Annual Meeting. Sherman and Morrison Hotels, Chicago, Ill. |
| June | 18. | Akron Rubber Group. Boston Rubber Group. |
| June | 20-24. | American Society of Mechanical Engineers. Pittsburgh, Pa. |
| June | 21-25. | International Rubber Technology Conference, London, England. |
| June | 25. | Detroit Rubber & Plastics Group, Inc. Summer Outing. |

## Program Available to Groups

"THE RMA Crude Rubber Quality Program," a paper by W. J. Sears, of The Rubber Manufacturers Association, Inc., 1832 M St., Washington 6, D. C., is available for presentation to rubber groups as a part of the program service[1] arranged by the liaison committee of the Division of Rubber Chemistry, American Chemical Society. Inquiries should be addressed to Mr. Sears, who, if not available himself, will arrange to have the address delivered.

[1] For more information on the Group Program Service, see INDIA RUBBER WORLD, Jan., 1954, p. 501.

## Vinyl Weathering

(Continued from page 628)

operated dry at 125° F., and continuous spray Weather-Ometers give particularly misleading results. In the open discussion which followed the talk, mention was made of the mechanism of sunlight discoloration and the effect of chelating agents on weathering properties.

## Polyester Prices Reduced

REDUCTIONS ranging from 2-3¢ a pound in the prices of several types of polyester resins produced by Celanese Corp. of America, New York, N. Y., have been announced. Said to be a result of more efficient production methods and lower raw material costs, the following lower costs for lots of 40 drums or greater are effective: MR-28V, 36½¢ a pound; MR-28C, 39¢ a pound; and MR-28R, 40¢ a pound.

## Design Award for Velon

VERSATILITY of design of Velon sheeting especially in the modern linear abstract patterns of the Tanglewood series, has earned for Firestone Plastics Co., Pottstown, Pa., the grand prize for plastics in a design competition sponsored by Hess Bros., Allentown, Pa. A plaque commemorating the award was presented to the manufacturer at a recent breakfast ceremony at the Waldorf Astoria Hotel, New York, N. Y.

Designed by Walter M. Litter and styled primarily for dinette chair upholstery, Tanglewood vinyl sheeting is available in a variety of colors in 12-gage thickness, 54 inches wide. It is one of a large group of Velon patterns, all styled for upholstery purposes.

## PVC Plasticizer—DIDP

COMMERCIAL production of di-isodecyl phthalate (DIDP), a general-purpose low-volatile plasticizer for polyvinyl chloride, has been begun by Monsanto Chemical Co., St. Louis, Mo. Similar to di-2-ethylhexyl phthalate (DOP) except for lower volatility characteristics, the new plasticizer is described as a clear, oily liquid which, when heat aged for six days

(Continued on page 650)

# NEWS of the MONTH

## Summary of Washington Report and National News

Eugene Holland, Chicago industrialist and business executive, was appointed executive director of the Rubber Producing Facilities Disposal Commission in January. His appointment rounds out the Commission's organization for the present and provides more adequate facilities for getting on with the interviews and other work in developing disposal details. Informal discussion with about 25 companies has been held, and descriptive brochures of all but the two alcohol-butadiene plants have been sent to prospective purchasers. Interesting figures on GR-S and GR-I production cost for the various plants are revealed in these brochures.

Changes in the natural rubber stockpile rotation procedure have been recommended by the subcommittee of the Rubber Business Advisory Committee of the General Services Administration. These recommendations will be presented to the full GSA Rubber Committee, probably in February.

Reconstruction Finance Corp. in its annual report to the Congress for fiscal 1953 recorded a net profit of $60 million on its synthetic rubber operations. The President's budget message to Congress also indicated expected production volume, inventory, and profit figures for RFC rubber operations for fiscal 1954 and 1955.

The Federal Trade Commission announced in late December that it had dismissed a price discrimination complaint against The B. F. Goodrich Co. involving the quantity discount schedule used in the sale of rubber and canvas footwear, following "a more thorough examination of books and records." The complaint was first filed 16 years ago.

The Rubber Manufacturers Association, Inc., urged Congress to continue the present tariff on imported rubber footwear, emphasizing that American rubber footwear manufacturers favor free competition, but insist that "before competition can be free it must be fair."

More statements from leading industry executives support the opinion that 1954 will be a good year for the rubber and associated industries. Plastics raw materials production, up 30% in 1953, is expected to rise another 5% in 1954.

# Washington Report by Arthur J. Kraft

## Eugene Holland Disposal Commission Executive Director; Commissioners Contacted by 25 Companies

Eugene Holland, of Glencoe, Ill., a Chicago industrialist and business executive, was appointed last month as executive director of the Rubber Producing Facilities Disposal Commission. Mr. Holland, 62, will head the Commission's staff on a full-time basis, directing the Commission's activities in negotiating the sale of the government owned synthetic rubber plants to private industry.

His appointment brings to the Commission a man with long experience in production. The three Commissioners, themselves, are not production specialists—Chairman Pettibone and Vice Chairman Rounds are bankers; and the third member, Mr. Cook, is a merchant and exporter of cotton. He was brought to the Commission by Mr. Pettibone, with whom Mr. Holland has had business dealings in the past.

Mr. Holland came on the job on January 18. In an interview the following day he described the disposal task as a "great challenge to every one interested in our industrial system." He expressed confidence that the industries directly involved would see it that way. Congress, he said, wants the plants sold to private industry. The challenge is in accomplishing that job in accordance with the Congressional mandate and the terms of the disposal legislation.

While Mr. Holland has had no previous experience in liquidation of industrial properties, or with the rubber industry, he has taken an active role in reorganization of industrial properties and has served as a receiver in Federal courts. He is currently president of lumber companies in Lincoln and Omaha, Neb., and Sioux City, Ia.

In 1928, Mr. Holland became president and director of Universal Gypsum & Lime Co. in Chicago, helping to reorganize that company's financial structure while it was in receivership. He left in 1936 to join a firm of business consultants in New York—specializing in management engineering. From 1940 to 1946 he was president and director of Florence Stove Co., Gardner, Mass.; Marshall Stove Co., Lewisburg, Tenn.; and American Rock Wool Co., Chicago. From 1946 to 1952 he was president and director of Masonite Corp., Chicago, and Marsh Wall Products, Inc., a subsidiary. At present he is a director of the Gulf, Mobile & Ohio Railroad, Fairmont Foods Co. of Omaha, Thomas Hoist Co. of Chicago, Holland Lumber Co. of Omaha and Lincoln, and Burke Lumber & Coal Co. of Sioux City. He founded Holland Lumber Co. shortly after his release from military service in the First World War. Mr. Holland is a graduate of the University of Nebraska, Class of 1913.

Chairman Pettibone, in announcing the appointment of Mr. Holland, said his selection rounds out the Commission's organization. The Commission's staff now includes an executive director, a special assistant in charge of information, a secretary, a general counsel, and an assistant general counsel, all of which posts have been filled. When negotiations for selling the plants get under way, after May 27, the Commission is expected to take on some additional personnel, such as accountants and statisticians, and perhaps more attorneys and an engineer, to serve as experts in analyzing bid proposals and advising the negotiators.

Descriptive brochures of all but the two alcohol-butadiene plants were being sent out to prospective purchasers last month. Similar brochures on the alcohol plants were in preparation at this writing and should be available this month. The Commissioners and Mr. Holland, together with E. D. Kelly, director, Office of Synthetic Rubber, RFC, will leave on February 8 for a nine-day tour of the government plants in Louisiana, Texas, and Los Angeles, Calif. They will visit the Louisville, Ky., Akron, O., and Institute, W. Va. plants in March.

As of now, the Commissioners have had informal discussions here with some 25 companies which have inquired about procedures and technicalities of submitting bid proposals. These have included, Mr. Pettibone said, "practically all present operators of the facilities." Several other companies not now in the synthetic rubber business have indicated their interest to bid on one or more plants, he disclosed. These talks have all come about on the initiative of the companies. The Commission has not asked anyone to drop in, although it has spread the word that it will welcome visitors who wish further information on bidding procedures.

While the Commissioners, as a group, have met together infrequently, each has managed to free himself from private business duties often enough so that one or more of the Commissioners has been in Washington at virtually all times. The appointment of the executive director assures that a top echelon representative of the Commission will be available for consultation in Washington almost continuously.

The Commissioners are encouraged by the number of inquiries received to date and anticipate many additional inquiries as the bidding deadline approaches. So far no bids have been submitted, and it is unlikely that much more than a handful—if any—will be filed very much prior to May 27. One of the companies, however, has informed the Commission that it is ready to submit a complete bid—naming an offering price—at any time. Another has suggested that it be permitted to file a bid now complete as to all terms except naming a price, leaving insertion of the price to some time close to the May 27 deadline. The reason for this suggestion is that the data required to be submitted under the disposal law are of a detailed and complex nature; the company would prefer to make certain in advance that its bid proposal will meet all legal requirements. If the Commission should detect a technical flaw while making an advance check of the bid, there will be time enough for the company to make any necessary revisions, prior to final submission. The Commission is considering this suggestion.

The Commissioners, on an individual basis, also have been keeping various Congressmen informed on the progress of disposal. The Commissioners have shown a keen awareness of the legislative history of the disposal law—including the arguments raised, mostly by Democratic Senators, against the bill prior to passage.

## GSA Rubber Committee Recommends Stockpile Changes

A six-member subcommittee of the Rubber Business Advisory committee to the General Services Administration, at a meeting here January 7 with GSA and other government agencies, proposed some change in the ultimate composition—grade-wise—of the natural rubber stockpile and in rotation procedures.

The subcommittee proposals—the details of which are being kept secret—are, at this writing (January 20), under review by the several government agencies concerned, chiefly GSA, the Office of Defense Mobilization, and the State Department. The industry proposals, perhaps with modifications, will be submitted to the full GSA Rubber Business Advisory committee at a later date, possibly in February.

The subcommittee, whose membership includes three dealers and three manufacturers, worked out their proposals in a seven-hour meeting. George K. Casto, head of GSA's Rubber branch, was chairman of the meeting, presiding during most of the discussion. Arthur Wolf, of ODM, presided at those points in the discussion dealing with policy, rather than operational matters.

As the stockpile program is set up, ODM has responsibility for framing policy—deciding what should be stockpiled, how much, and how quickly. If the grade composition of the natural rubber stockpile is to be changed, it will be up to ODM to make that decision. GSA's role in stockpile matters is as purchaser and manager of the stockpile, operating under broad directives from ODM. ODM's responsibility derives from its absorption last April of the Munitions Board's functions in the defense field. The Munitions Board, which had been part of the Defense Department, was abolished under a presidential reorganization plan. GSA is currently managing the rubber stockpile under a Munitions Board directive of February, 1952, which directed rapid replacement of the large tonnages of non-stockpile (low- or off-grade rubber), with higher grades called for by the stockpile schedule.

In earlier discussions rubber dealers took the position that rotation should be slowed down and that the stockpile schedule should be revised to provide for a fairly substantial quantity of low-grade rubber in the permanent stockpile. The manufacturer representatives on the full advisory committee sought more modest changes in the ultimate composition of the stockpile. The nature of the compromise worked out at the meeting of the subcommittee January 7—assuming they each made concessions—could not be learned. It was reported that the subcommittee agreed on their recommendations; so there must have been some meeting of minds between dealer and manufacturer representatives.

Attending the January 7 meeting, in addition to Mr. Casto and Mr. Wolf, were representatives of the Commerce and State departments; and the vice presidents of the RMA and the Rubber Trade Association of New York, W. J. Sears and R. T. Young, respectively. Members of the subcommittee, all of whom attended, are Alan L. Grant, Charles T. Wilson Co.; D. A. Patterson, H. A. Astlett Co.; Jacobus Frank, Jacobus Frank & Co.; E. C. Schwaub, United States Rubber Co.; Ralph Au, The B. F. Goodrich Co.; and, R. B. Bogardus, Goodyear Tire & Rubber Co.

## RFC Reports on Synthetic Rubber Operations for Fiscal 1953

The annual report of RFC to the Congress for the fiscal year 1953 was released in late December and confirmed previous estimates that the net income for synthetic rubber operations for the year ending June 30, 1953, amounted to about $60 million. Income from the sale of synthetic rubber was $387,712,241.

The report pointed out that fiscal year 1953 was the first complete year in more than 10 years that the rubber consuming industry purchased and consumed synthetic rubber without government controls, and that since sales of GR-S amounted to 685,000 long tons in that period, it is apparent that GR-S held its own in open competition without the benefit of government controls.

During the fiscal year 1953, government owned plants produced 741,242 long tons, including oil content of synthetic rubber, of which 666,221 were general-purpose GR-S and 75,021 long tons were Butyl rubber. The total production of synthetic rubber from government owned plants represented 54.3% of total domestic new rubber consumption, which was 1,363,985 long tons. RFC also produced 522,374 short tons of butadiene and 58,285 short tons of styrene.

During the entire year the petroleum butadiene production was at a maximum rate as limited by feedstock availability and plant capacity. In the latter part of the year most of the large expansion projects previously authorized were completed. As additional feedstock became available, individual new monthly butadiene production records were established at several plants, it was said.

The plant-scale study of a new butylene dehydrogenation catalyst continued during the year at the butadiene plant at Baytown, Tex., operated by Humble Oil & Refining Co. Although many of the problems involved with this new-type catalyst have been solved, the results to date are still inconclusive, and no further conversions to this catalyst are currently contemplated, the RFC report said.

Government facilities are capable of producing annually 600,000 net long tons of cold rubber, approximately 72% of the total net productive capacity. A total of 356,000 net long tons of LTP GR-S was produced during the year, or about 56% of the total net GR-S produced.

Eugene Holland

Black masterbatch production declined from 16% of total net GR-S production at the beginning of the fiscal year to about 10% at the year-end. Total GR-S black masterbatch production for the year amounted to 116,681 long tons, including carbon black. On a net basis, this is equivalent to 12% of the total GR-S produced.

Oil masterbatch containing 25 to 37.5 parts processing oil has acquired a significant position in consumption of rubber. Facilities for making oil masterbatch in six plants provide a combined yearly capacity of approximately 240,000 long tons, including oil content. Total production in the fiscal year was 108,054 long tons, including oil content, which on a net basis amounted to 13% of the total GR-S produced. This is an increase of about 285% over the previous year's output.

Oil-black masterbatch production did not change much during the year, remaining at about 2% of total net production and amounting to 20,304 long tons, including oil and black.

GR-S latex production reached an all-time high in fiscal 1953 with a total of 45,088 long tons total solids, or 7% of total GR-S production. Cold latex production, and particularly the oil solids-type latex used in the manufacture of foam sponge, increased during the year. Cold latex accounted for 30% of the total latex produced in the program.

During fiscal 1953, a total of 75,021 long tons of Butyl rubber was produced. This amount was about 90% of that produced in 1952. Production during the first eight months of fiscal 1953 was below capacity because of high inventories, but maximum production was maintained in the last four months. No increase in productive capacity for Butyl rubber was installed.

Research and development activities during fiscal 1953 were conducted by eight industrial organizations operating GR-S plants, by the Government Laboratories, by the Government Tire Test Fleet, by the National Bureau of Standards, and by 10 universities, institutes, and other research organizations. Total expenditures for research and development were $6.1 million, or 2% of the gross sales value of GR-S produced.

Capital expenditures for expansion of productive capacity, conversion to cold rubber, process and other improvements, and replacement of worn-out and obsolete equipment amounted to $21.9 million during fiscal 1953. A total of $25.5 million, or approximately $35 per long ton of rubber produced, was spent for maintenance and repairs.

The net income for fiscal 1953 rose to $59.9 million, four times the $16 million in the preceding year, and equal to 15% of the sales of all rubber produced in the RFC plants.

## RFC Rubber Production and Sales Figures

RFC reported in January that it sold 39,070 long tons of GR-S and 4,886 tons of Butyl rubber in December and had scheduled January output at 43,200 tons of GR-S and 5,500 tons of Butyl. The GR-S figure includes oil content of masterbatch rubbers.

December sales of GR-S included 27,448 tons of LTP; 5,366 tons of black masterbatch; 11,127 tons of oil masterbatch; 2,077 tons of oil-black masterbatch; and 3,884 tons of latex. January scheduled output calls for 28,300 tons of LTP; 5,200 tons of black masterbatch; 11,100 tons of oil masterbatch; 1,786 tons of oil-black masterbatch; and 3,980 tons of latex.

## GR-S Production Costs for Various Plants

The cost of producing GR-S varies considerably, depending upon changing costs of the principal raw materials consumed in its manufacture and also upon which copolymer plant is doing the producing. These facts, while known in a general way in the past, will loom ever more important now that the government is preparing to sell its synthetic rubber facilities to private industry. The government's pricing policy for GR-S, as well as for Butyl, has been based on average production costs program-wide. When and if private firms buy the plants, individual producers will not be able to do this; each plant will have to pay its own way, meaning—it is generally expected—a variation in prices for GR-S and Butyl reflecting to some extent the variation in production costs, plant to plant.

Actual differences in plant production costs have been disclosed by the RFC in brochures distributed to prospective bidders by the Rubber Producing Facilities Disposal Commission. The most recent figures cover the 12-month period which ended June 30, 1953. Among the 10 copolymer plants producing only standard GR-S, production costs ranged from a low of 14.28¢ a pound (Goodrich, Port Neches, Tex.) to a high of 23.63¢ a pound (Kentucky Synthetic, Louisville, Ky.). The former plant operated on petroleum butadiene supplied by the nearby Neches Butane Products Co.; while the latter operated on alcohol butadiene—a much higher cost material—supplied by the nearby facility operated by Union Carbide & Carbon Co. Three other copolymer plants produced latices, and their costs were higher than any of the 10 producing standard GR-S.

Production costs at the two Butyl facilities were 14.55¢ a pound at Baytown, Tex., and 16.23¢ a pound at Baton Rouge, La., during fiscal 1953. In the year previous, Baytown's cost was 13.69¢ and Baton Rouge's cost was 17.25¢ a pound. The gap was yet wider in fiscal 1951, when Baytown's cost was 12.16¢ and Baton Rouge's cost was 19.23¢ a pound.

The following table shows the per pound plant production cost at the 13 copolymer facilities for each of the past three fiscal years, 1953, 1952, and 1951. Explanation of the year-to-year variations will follow:

GR-S Production Costs—Various Plants

| | 1953 | 1952 | 1951 |
|---|---|---|---|
| Naugatuck, Conn. (U. S. Rubber)* | 25.75 | 24.48 | 17.10 |
| Los Angeles, Calif. (Midland) | 16.92 | 18.63 | 18.94 |
| Louisville, Ky. (Ky. Syn. Rub.) | 23.63 | 24.78 | 20.69 |
| Akron, O. (Goodyear)† | 33.68 | 25.41 | 23.08 |
| Institute, W. Va. (Goodrich) | 17.06 | 21.06 | 20.53 |
| Lake Charles, La. (Firestone) | 16.09 | 18.17 | 15.68 |
| Akron, O. (Firestone)* | 26.34 | 23.84 | 17.11 |
| Baton Rouge, La. (Copolymer) | 18.04 | 18.94 | 15.68 |
| Port Neches, Tex. (U. S. Rubber) | 14.74 | 18.03 | 17.67 |
| Baytown, Tex. (General Tire) | 17.50 | 19.25 | 16.51 |
| Port Neches, Tex. (Goodrich) | 14.28 | 18.11 | 15.41 |
| Houston, Tex. (Goodyear) | 15.86 | 18.42 | 15.78 |
| Borger, Tex. (Phillips) | 14.71 | 19.59 | 17.33 |

*Produced both standard GR-S and latices in all three years.

†Produced both standard GR-S and latices in fiscal 1951 and 1952; produced latices only in fiscal 1953.

A principal factor in the variation in the average production cost per pound among the three years was the cost of butadiene consumed. This variation is reflected in the case of each of the 13 plants. During the period from July 1, 1950, through March 31, 1952, the cost reflected is based upon standard transfer prices approximating *average program-wide cost of production*, plus freight, *including relatively high-cost butadiene produced from alcohol*. The transfer prices applied are as follows: July 1, 1950, through January 31, 1951, 8.50¢ transfer price and 7¢ recycle credit; February 1, 1951, through March 31, 1952, 16¢ transfer price and 14¢ recycle credit.

The cost of butadiene consumed during the period April 1, 1952, through June 30, 1953, on the other hand, is reflected on the basis of transfer prices approximating the monthly cost of production of the *particular plant from which supplied*, and not a program-wide average as in the earlier period.

The average cost of styrene did not vary so sharply as for butadiene. However the same general pricing policy applied over the period mentioned.

## Rubber Items in President's Budget

The President's annual budget statement, presented to Congress on January 21, provided a forward look at what may be ahead for synthetic rubber sales from now until the government owned plants are transferred to private industry.

Production of synthetic rubber—including GR-S and Butyl—is expected to total 608,900 long tons in the 12 months ending June 30, 1954, and 600,000 tons in the following year. Last year, as the RFC report noted, output amounted to 712,769 tons (net without oil or carbon black). The 600,000-ton output forecast for fiscal 1955 is based on estimated consumption. All of the year's production will be consumed, the budget statement predicted.

Sales of synthetic rubber totaled $412,027,886 (includes freight charges) in the year ended last June 30 and yielded a net profit of $59,929,609, equivalent to 14.5%. That record dollar profit will not be equalled again during the government's stewardship of this industry, but the profit margin will be exceeded next year, according to the budget estimates.

Sales in fiscal 1955 are projected at $326,920,000, yielding a profit of $48,470,000, equivalent to 14.85%—a record-breaker. In the current fiscal year, which ends June 30, 1954, sales are estimated at $327,388,800, yielding a profit of $42,814,500, equivalent to 13%. The sales figures include freight charges to customers of $19,854,514 in fiscal 1953; and $18 million in each of the following years.

The government will hold an inventory of synthetic rubber, raw materials, chemicals, and processed stock valued at $36.8 million on June 30, 1955, as compared with an expected inventory of $38.6 million on June 30, 1954, and the $49,562,424 inventory with which it closed on June 30, 1953. It would appear from these estimates that the government expects to hold about 76,000 tons of synthetic rubber when, come mid-1955, it transfers the plants to private owners, assuming the present disposal program succeeds.

Expenses of the rubber program, as estimated for fiscal 1955, include a $219,583,000 item for the cost of producing synthetics—that is, the cost of raw materials and their processing into GR-S or Butyl; a $26 million item for depreciation; $5.2 million for research and development; and other expenses bringing the total to $278,450,000. These other expenses, incidentally, include $625,000 for the Rubber Disposal Commission. The Commission is in for a $450,000 item in the fiscal 1954 budget.

The government plans to spend $15 million for replacement and process improvements in the rubber plants in fiscal 1955, as compared with $16 million in fiscal 1954 and $22.1 million so spent in fiscal 1953. The value of the plants, property, and equipment is rising as a result of these capital improvements, from $511.9 million at the end of fiscal 1952 to $528.4 million in fiscal 1953 and an estimated $540 million in fiscal 1954 and $551 million on June 30, 1955. All but $143.6 million will be written off as depreciation by the latter date—as a bookkeeping matter, only. If and when the government sells the plants, it will be aiming for a price closer to the $551 million figure, which represents, in RFC's estimation, the value of the facilities.

The report sheds no light on which agency will be designated to operate the synthetic rubber program after June 30, 1954, when RFC is abolished. Current guesses are that the program will be transferred to the Treasury Department. RFC Administrator K. R. Cravens and his chief deputy, L. E. Robbins, both have been appointed in recent months as assistant secretaries of the Treasury.

There is no indication whatever that RFC contemplates any change in its selling price for either GR-S or Butyl rubber. The improved profit picture for fiscal 1955, as compared with fiscal 1954, is based chiefly on lower processing costs. RFC cancelled its high-cost butylene contracts during the current fiscal year; thus the first full year of operation in which this cost saving will be reflected is fiscal 1955.

## Yohalem Resigns from RFC Rubber Activity

The resignation of Morton E. Yohalem as special deputy for Rubber Facilities Disposal, Reconstruction Finance Corp., was announced December 21 by RFC Administrator Kenton R. Cravens. Mr. Yohalem, who joined RFC in June, 1952, is now engaged in the private practice of law in Washington.

In accepting Mr. Yohalem's resignation, which became effective January 1, Mr. Cravens said: "I would like to express my appreciation for the services you have rendered the Federal Government and this Corporation. The advice and assistance you have given me have been extremely valuable."

While with RFC, Mr. Yohalem took the leading role in drafting that agency's recommendations to Congress favoring immediate enactment of legislation authorizing sale of the government owned synthetic rubber facilities to private industry.

Subsequent to the enactment of disposal legislation last summer, Mr. Yohalem assisted the Rubber Producing Facilities Disposal Commission, which was appointed by the President to sell the rubber plants, in getting under way. Prior to joining RFC, Mr. Yohalem had served as director of the Public Utilities Division, Securities & Exchange Commission, from 1947 to May, 1952.

## FTC Dismisses Footwear Complaint against Goodrich

The Federal Trade Commission, on December 24, announced that it had dismissed a price discrimination complaint against The B. F. Goodrich Co., involving the quantity discount schedule used in the sale of rubber and canvas footwear. The dismissal culminated proceedings launched 16 years ago. And, in a burst of candor rare

to bureaucracy, the Commission conceded that it had been off on the wrong foot from the start.

The full story goes back to 1937 when the Commission decided to use its new anti-trust weapon, the Robinson-Patman Act, in taking a look at the quantity price differentials granted by a Goodrich affiliate, Hood Rubber Co., on sales of rubber and canvas footwear. This investigation convinced the Commission that Hood's discounts could not be justified by cost savings. The complaint filed against Hood a few years later was dismissed by the Commission after V-J Day—but only because Hood had by then been dissolved and made a division of Goodrich. On came the Commission with another complaint, this time against Goodrich, in July, 1949.

Goodrich hired outside accountants to help convince the Commission that the Hood division's discount schedule was cost justified. The company filed cost figures in April, 1951. It took the Commission until this past spring to start hearings. Two months ago a Commission examiner —"without objection" from the Commission's staff—gave Goodrich a clean bill of health on nine of the ten brackets of its quantity discount schedule. Of the single bracket not cost justified, he said:

"There can be no public interest . . . in pursuing an inquiry relating to a discount bracket affecting such an insignificant [one half of 1%—EDITOR] proportion of respondent's business from which no possible substantial injury to competition could result."

Spartan-like, the Commission explained: "The examiner said the stipulation upon which the dismissal was based followed 'a more thorough examination' by Commission accountants 'of the books and records of the respondent than was made prior to the issuance of the complaint.'"

Goodrich found that the cost of educating the Commission's staff to that fact comes high. The company spent more than $200,000 on outside accountant and attorneys' fees alone before the Commission finally threw in the towel and conceded that it never had a case, after all.

The Goodrich case was a companion to a complaint brought against U. S. Rubber, also in 1949. That ended a year later with a cease-and-desist order, in which it was stipulated that all but a few of the brackets of U. S. Rubber's footwear quantity discount schedule either were cost justified or were so little in excess of the amount of discount which could be justified by savings in cost that they were considered de minimus—too minor to warrant censure by the order.

## RMA Urges Continued Tariff on Footwear

The RMA Rubber Footwear Division has distributed to each member of Congress a booklet setting forth its case for continued tariff protection against cheaply produced imported rubber footwear. The booklet contains the formal statement presented by the RMA division to the Commission on Foreign Economic Policy, headed by the Inland Steel Co. president, Clarence Randall. The Commission was appointed by President Eisenhower to draw up recommendations for the guidance of Congress and the administration on tariffs and other aspects of foreign trade policy. The Commission was expected to make its report in late January or soon thereafter.

Fourteen of the 31 domestic rubber footwear manufacturers are members of the RMA. Their statement pointed out that tariff protection must be continued in order to hold the domestic market against major inroads of cheap competition, particularly from Japan and Czechoslovakia. Already, the large export market once enjoyed by American manufacturers of rubber footwear has been almost completely lost to foreign producers, the statement noted.

The RMA brief pointed out that American rubber footwear makers favor free competition, but insist that "before competition can be free it must be fair. They have no fear that foreign producers will outpoint them in efficiency or industry." The best way of compensating for difference in costs of production as between domestic and foreign competitors is through tariffs, the RMA statement declared.

The manufacturers urged retention of the American selling price formula under which imported rubber footwear has been dutiable since 1933. They also pointed out that the American rubber footwear industry fills a vital defense role by supplying specialized military needs and contributes importantly to this country's economic prosperity by employing 22,000 production workers. The industry produces about 75 million pairs of waterproof rubber footwear and rubber-soled fabric footwear annually, with a total value of $200 million at the manufacturer level.

## Export Restrictions Eased

The Department of Commerce eased export restrictions on several types of rubber products during January. Exports of V-belts and Pliofilm now may be made to all countries except Hong Kong, Macao, and the Soviet bloc without applying for individual export licenses. In a related move, several other rubber items were added to the list of non-strategic commodities which exporters may ship to Hong Kong without applying for individual licenses. These items include balata, gutta percha, and other crude allied gums; rubber toys, balls, and novelty balloons, except for dolls, golf and tennis balls; hard rubber goods not specially fabricated for particular machines or equipment, except for electrical hard rubber goods; solid tires, except truck and industrial; and rubber tiling and flooring.

These changes in export licensing restrictions are detailed in "Current Export Bulletin No. 722," published by the Bureau of Foreign Commerce, U. S. Department of Commerce, Washington, D. C., and dated January 14.

# National News

## More Industry Executives See Good Year in 1954

More year-end statements from rubber industry executives received since we went to press for January supported the opinion that 1954 will be a good year for the rubber industry, even though it might not quite equal record-breaking 1953.

**P. W. Litchfield,** chairman of the board, Goodyear Tire & Rubber Co., said prospects are that 1954 will be another year of high-level activity, somewhat below 1953. Our postwar program of plant expansion and improvement has brought us to the point where we can produce more goods and operate more efficiently than ever before. There will be less capital expansion in 1954, he added.

The overall prospects for the rubber industry indicate continued growth over the next decade. This growth probably will not be in the form of a steady line from year to year, but the long trend is toward higher levels, it was said.

**H. E. Humphreys, Jr.,** president, U. S. Rubber, declared sales of the rubber industry, estimated at $5.5 billion in 1953, may be 7% lower in 1954.

Replacement tire demand will be up 2½%. Sales of 77 million passenger-car tires and 13 million truck and bus tires, for a total of 90 million, are expected this year. Demand for industrial products will continue good, although not so strong as in the past two years. This executive feels that increasing demand for wire and cable, new types of transmission belts, plastic pipe, and other plastic industrial products will partly offset any declines in other lines.

Rubber industry defense business declined in 1953 to 12½% of total sales, and a further decrease to about 10% is expected in 1954, it was added.

**John L. Collyer,** president, B. F. Goodrich, estimated that overall industry tire sales in 1954 will approach 100 million for the second successive year. He agreed, however, that total passenger-car tire sales may decline to 77 million. A new rubber consumption in 1954 of 1,300,000 long tons, with probably more than half of this coming from America's synthetic rubber facilities, was also predicted.

**J. P. Seiberling,** president, Seiberling Rubber Co., predicts that only in 1950 and 1953 were more tires sold than the industry expects to ship in 1954. In fact, he believes that the rubber industry will sell more tires in the replacement market in 1954 than ever before in one year, except for the unusual postwar years of 1946 and 1947, when the industry was satisfying pent-up wartime demand. Replacement tire sales of 60 million units in 1954 was estimated.

**J. R. Hoover,** president of B. F. Goodrich Chemical Co., emphasized that in 1954, companies in the chemical field will have to equip themselves more than ever before to stimulate demand for plastics and other chemical materials through better sales techniques, improving old products, developing new products, and finding new markets. At the same time the companies must halt the trend of rising costs by better methods of production, and only those organizations which prove themselves fundamentally sound will be capable of meeting this challenge.

During this era, he suggested, companies should be permitted to select more practical rates of amortization on their new, more costly facilities. Hoover also pointed out that the chemical industry, through its research and technology, specializes in creative obsolescence, generating and feeding on change, and that every barrier which tends to slow creative enterprise's inherent dynamic progress should be removed.

**Giffels & Vallet, Inc., L. Rosetti,** one of the world's largest engineer-architect firms, estimates 1954 volume of re-

placement of existing plants and distributing facilities in the rubber and plastics industries at about $15 million, or equal to that of 1953.

Although industrial emphasis in 1954 will be on improved manufacturing facilities to lessen the pressure between cost of goods sold and selling prices, an extremely interesting development is the extraordinary number of research and scientific laboratories now in process of engineering and design for some of the most aggressive companies in the nation and Canada. Since the lead-time of a research project averages between four and 10 years, depending on the industry involved, unprecedented research activity, which will mean a steadily growing work force and national economy, is in store for the nation.

Some industries are hard pressed to reduce costs of manufactured goods. Many large automobile, appliance, and rubber and plastic firms are rehabilitating and relocating plants and are building new plants more nearly to offset increased labor and freight rates with lower production and distribution costs.

## Plastics Production up 30% in 1953

According to the Society of the Plastics Industry, Inc., another new record was established by the plastics industry in 1953, in the all-time high of approximately three billion pounds of raw materials produced. This estimate is 30% above the actual production of 2,333,924,000 pounds of synthetic resins produced in 1952.

Prospects for 1954 appear fairly satisfactory and indicate a small increase of perhaps 5% over 1953 figures, or about 3,150,000,000 pounds of plastics raw materials. The 1953 value of all plastics products approximated $1.5 billion, and the SPI estimates that these products will be valued at $1.575 billion for 1954.

In a year-end survey of sales statistics covering a representative group of 133 injection, compression, transfer, and extrusion molders, it is revealed that gross sales of these companies for the first 10 months of 1953 were up 34% from the sales of the same period of the previous year.

A breakdown of SPI sales statistics representing only molded products sold by these 133 SPI member companies follows:

| | 1953 | 1952 |
|---|---|---|
| Thermosetting | $ 84,596,653 | $63,887,464 |
| Thermoplastic | 109,428,731 | 76,904,258 |
| Extrusion | 18,450,590 | 15,800,973 |
| Molds | 12,835,785 | 10,502,523 |

Based on U. S. Tariff Commission figures, the largest rate of increase in molding materials was recorded by the phenolics, which were up 49%, based on figures for the first nine months of 1953. Polystyrene molding materials were up 43%, with the cellulosics and vinyls up 41 and 20%, respectively. For the first nine months of 1953, other molding materials, including polyethylene, nylon, and acrylics, showed an increase of 36%.

There is a feeling in the plastics industry that the first few months of 1954 will continue to experience the mild decrease in production rates which developed in November and December of 1953, but this condition is not expected to be severe or to continue past the middle of the year.

# Other Industry News

## Natural Rubber Packaging

The first shipment of natural rubber crepe packaged in polyethylene wrappers and contained in five-ply Kraft paper bags arrived in New York, N. Y., January 18, in excellent condition. Packed on a Sumatra plantation by Veth's Papieren Zakkenfabriek N.V., Amsterdam, Holland, for H. A. Astlett & Co., New York, the shipment represents an attempt on the part of the rubber supplier to provide companies in this country with rubber uncontaminated with foreign materials.

Both polyethylene film and polyethylene-coated paper were used to wrap the 83-pound bales of crepe. The wrapped bales were then placed into the bag, manufactured with one end sewn to facilitate opening at the customer's plant, and closed with nine metal staples and a strip of gummed paper. Dimensions of the final package are approximately 10 by 20 by 40 inches.

Witnessed on the pier following their unloading, shipments of both film wrapped and coated-paper wrapped crepe appeared in excellent shape. Very few of the bags were torn, in no case sufficient to contaminate the rubber, and no distortion of the bales was visible. When packages were opened for inspection, only very slight traces of the polyethylene were found adhering to the crepe.

Although customers will have to pay a small premium for rubber thus packaged, the difference can probably be made up by elimination of the trimming operation normally required on crepe packaged in the bare-back manner (165-180-pound bales wrapped with crepe sheets of the same quality and dusted with talc). With the new method, no contamination of the outer sheets is possible unless the bag and the wrapper are torn. Another advantage of this type of packaging is that those processes in which the incorporation of small amounts of polyethylene is not harmful can use the crepe without separating it from the film wrapper. Also, visual sampling of bales wrapped with polyethylene film can be accomplished without exposing the rubber.

The application of this type of packaging to natural rubber smoked sheets is contemplated, but no trial shipments have been made as yet.

## Plasticizer Production

The commercial production of Cabflex ODP (iso-octyl decyl phthalate) and of Cabflex ODA (iso-octyl decyl adipate), two new plasticizers for vinyl compounds, has been announced by Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. Manufactured from raw materials synthetically produced for the production of esters, the new products offer the advantages of lower volatility (resulting in improved flexibility permanence in vinyls), as compared to octyl esters, and will be priced no higher than the esters.

### Wollastonite Representatives

Morton-Myers Co., Kansas City, Mo., and John D. Butts, Pittsburgh, Pa., long-time sales agents for Godfrey L. Cabot carbon blacks to the paint, varnish, and printing ink industries in their respective locations, are now handling sales of Cabot Wollastonite to the paint industry. The calcium metasilicate, product of the white pigments division of the Boston firm, is recommended for use as an extender in house paint, interior flats and semi-glosses, primer surfacers, and latex paints.

## Trimble Reclaimers President

The Rubber Reclaimers Association, Inc., 250 W. 57th St., New York 19, N. Y., at its annual meeting, January 19, elected as its president Gilbert K. Trimble, president of Midwest Rubber Reclaiming Co.

Irving Laurie, general manager of Laurie Rubber Reclaiming Co., was elected vice president. Charles T. Jansen, *Rubber Age*, was reelected secretary-treasurer, and Jean H. Nesbit, of U. S. Rubber Reclaiming Co., was appointed chairman of the executive committee.

## New Neoprene Plant

Preliminary plans for the construction of a new plant to manufacture neoprene synthetic rubber at Montague, Mich., were announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The plant will be erected on a 1,000-acre site that adjoins property of the Hooker Electrochemical Co. and the Union Carbide & Carbon Corp. Facilities soon to be constructed on these sites will supply the du Pont unit with anhydrous hydrogen chloride and acetylene for the manufacture of neoprene.

Both du Pont and Union Carbide optioned the land from Hooker, who in turn had previously optioned the property in accordance with a long-range development program. Construction of the Hooker chlorine plant is already under way; while tentative plans for the du Pont plant call for the beginning of construction in late 1954, with partial operation expected by early 1956. Both raw materials are expected to be piped into the du Pont facility.

The current output of neoprene is produced in du Pont's Louisville, Ky., plant, where an expansion program is now under way. Recent additions to these facilities have proved adequate for existing needs, and the present expansion will meet the growing demand for neoprene until the new plant is operating.

## Kullander in New Post

The appointment of Donald E. Kullander to the post of manager of industrial relations of Hewitt-Robins, Inc., Stamford, Conn., has been announced. The position formerly held by Mr. Kullander, that of personnel manager at the Buffalo plants of the company, is now occupied by J. J. Sheeran, Jr., previously assistant director of industrial relations at Johnson & Johnson. Mr. Kullander, an industrial engineer, had been with Western Electric before joining Hewitt in 1948.

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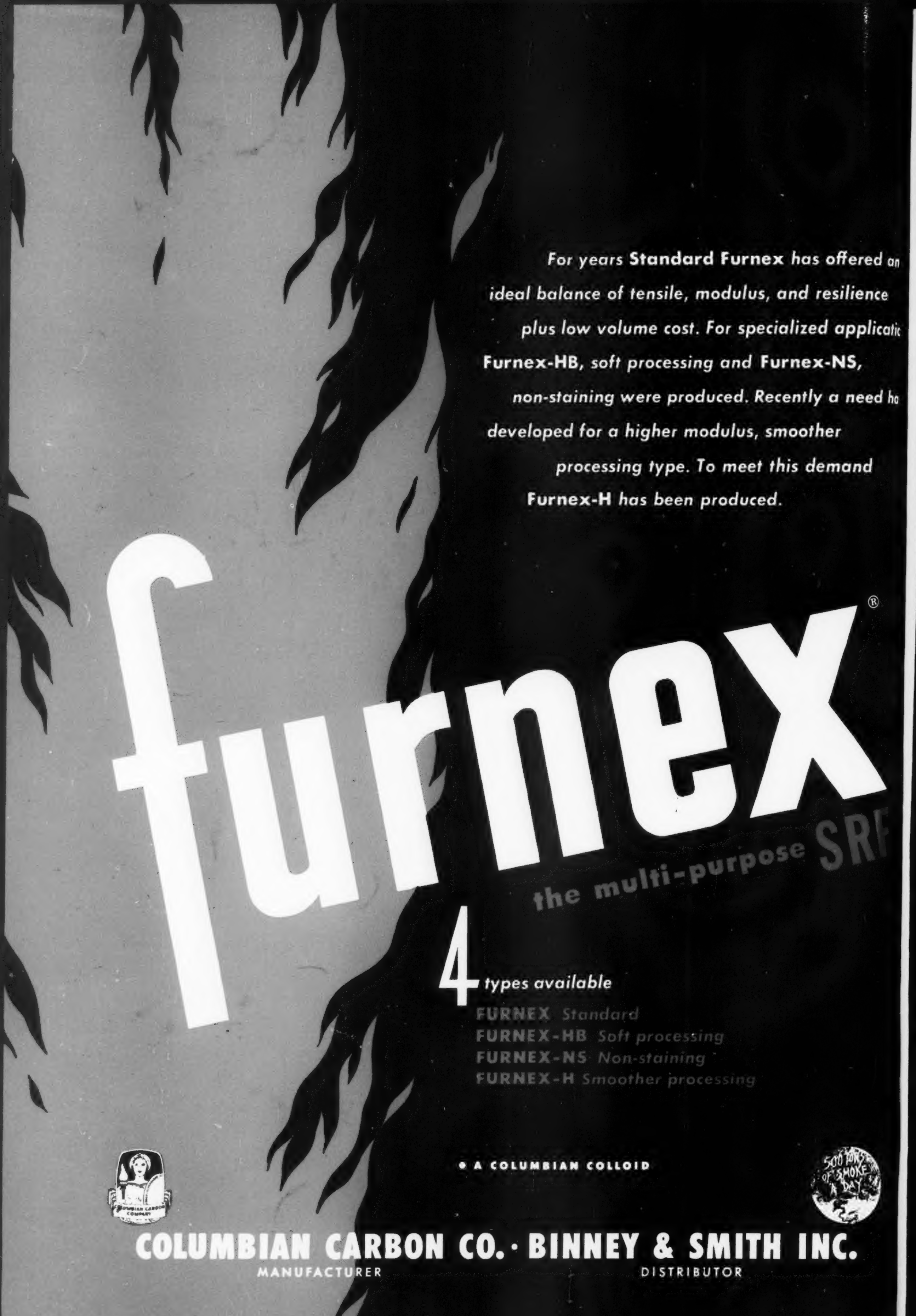

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## G-E Appointments

The General Electric Co.'s silicone products department has transferred its technical service unit from its engineering section to the marketing section, in an organizational move designed to bring custom engineering of silicone products closer to end-user needs. The technical service unit's primary responsibility is to assist customers in solving their technical problems and to compile and evaluate technical data on silicone products.

Charles E. Reed, general manager of the department, concurrently announced that John T. Castles had been appointed manager of the technical service unit. Mr. Castles will report to Mark K. Howlett, manager of marketing.

Mr. Castles joined G-E in 1947 as a chemical engineer in Waterford, N. Y., his present headquarters. In 1950 he was named manager of that plant. During World War II, Mr. Castles was a captain in the U. S. Army. He is a member of the American Institute of Chemical Engineers, the American Chemical Society, and the Society for the Advancement of Management.

Roy W. Hill and John B. Hinds, Jr., have been named phenolic products sales representatives at the Chicago, Ill., office for the G-E chemical materials department. In their new capacities they will report to E. M. Irish, manager—sales, phenolic products section, G-E chemical materials department at the department's headquarters in Pittsfield, Mass.

Mr. Hill started in the company's business training course in 1946. He was appointed supervisor—customer service for the chemical materials department in April, 1950, and supervisor of production, phenolic products, in December, 1951. He saw service in World War II. Mr. Hill will be responsible for sales of phenolic molding compounds, polyester resins, and magnesium oxide.

Mr. Hinds began in the chemical materials department in May, 1953. Previously he had been superintendent and manager of the St. Lawrence Foundry & Machine Co. and had served in many related posts in the foundry industry for ten years. During World War II he was with the U. S. Army Air Forces. Immediately prior to his transfer to Chicago, he handled foundry products sales at the department's Pittsfield headquarters. In his new post Mr. Hinds will service foundries in the Chicago area with G-E foundry materials, resins for shell molding, core binders, and silicone release agents, plus industrial resins and varnishes.

## Maleic Anhydride Briquettes

The marketing of Aero maleic anhydride in briquette form has been announced by American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. The chemical is widely used as an intermediate in the production of synthetic resins, rubber chemicals, surface active agents, plasticizers, and stabilizers for vinyl resins.

**Smith Chemical & Color Co., Inc.,** Brooklyn, N. Y., has been appointed exclusive sales agent for Northern Pigment Co., Ltd., New Toronto, Ont., Canada, manufacturer of synthetic ferrite pigments. A complete range of yellow and red iron oxides for use in the rubber and plastics fields is available through this sales representative for the Eastern Seaboard area from Connecticut to Florida.

*Beidler-Viken*

**Whitney Bird** **Lawrence Brady**

## Brady and Bird Join Barry Co.

B. J. Barry & Co., Inc., textile selling agent, 62 Worth St., New York, N. Y., has made two additions to its staff, Lawrence Brady and Whitney Bird, both of whom will assist in merchandising products of mills represented by Barry as sole selling agent, including W. A. Handley Mfg. Co., manufacturer of high-grade specification fabrics for industry, laundry textiles, filter cloths, and cotton ducks of all types; and Massapoag Mills Corp., manufacturer of special constructions for the book cloth, drapery, and converting trades.

J. A. Kelliher, Barry president, further announced that Mr. Brady will continue to cover the linen supply and industrial field, handling sales of wide sheetings produced by Pinecrest Cotton Mill, division of Kansas City White Goods Mfg. Co. Mr. Brady gained his business experience with Mitsui & Co., Fordham Textile Co., and, most recently, with W. H. Combs, Jr., cloth broker.

Mr. Bird also is widely known in the textile industry, having been with Turner-Halsey Co., Southeastern Cottons, J. L. Stifel & Sons, and, for the past seven years, with The Dunson Mills.

## Shell's New Ammonia Division

The formation on the first of the year of a new ammonia division to handle the manufacture, distribution, and sale of the chemical vital to agriculture and industry has been announced by Shell Chemical Corp., 50 W. 50th St., New York 20, N. Y. Located in San Francisco, Calif., the new division is headed by G. R. Monkhouse, vice president of the company, with L. M. Roberts as operations manager, and V. C. Irvine as sales manager.

## Nygen Tire Production

The large-scale manufacture of passenger-car tires that are reported to be the first in this country to be constructed with Nygen cord, a special cord converted from nylon fabric, has been announced by The General Tire & Rubber Co., Akron, O. Called the Nygen Super Squeegee, the product is described as capable of witstanding impacts sufficient to buckle the flanges of a standard car wheel without bursting.

The Nygen cord, represented as being stronger than steel cable when compared on a weight basis, is manufactured by twisting nylon filament into cord and prestretching the cord under heat. This latter operation increases the strength of the tire cord, eliminating dangerous stretch and providing greater protection to the motorist at turnpike speeds, it is claimed.

## Promoted by Monsanto

Reid G. Fordyce has been advanced to the newly created post of director of development and technical service of Monsanto Chemical Co.'s plastics division, Springfield, Mass.; while Eli Haddad and Ivan V. Wilson were made assistant directors of technical service.

Monsanto's plastics division recently announced a $1,250,000 technical service and development program which will include a new applications and development research center. The program is designed to intensify both day-to-day and long-range exploration for new markets and applications for plastic materials.

Fordyce joined Monsanto's central research department at Dayton, O., in 1935. In 1944 he was made group leader and in 1947 moved to the plastics division as manager of product development. In his new capacity Fordyce will head product and market development and customer servicing in the area of technical assistance.

Haddad started with the plastics division as a research chemist in 1944. In 1949 he was transferred to the central research department, rejoined the plastics division a year later, and in 1953 was promoted to senior sales engineer in charge of technical service for Ultron vinyl film. As assistant director of technical service, Haddad will be in charge of the technical service activities of the Ultron vinyl film, Resinox thermosetting molding materials, Lustrex styrene molding materials, Saflex vinyl butyral and polyethylene product groups.

Wilson was first employed by Monsanto in 1927 as a coatings salesman for its Merrimac Division at Everett, Mass. In 1934 he moved to the development group of that division and rejoined the group in 1938, after a special sales engineering assignment with the central research department. Named assistant director of research at Everett in 1947, he was transferred to the plastics division as coordinator for the vinyl chloride products program in 1951. Product areas for which Wilson will be responsible include: Opalon vinyl resins and compounds, Resinox and Resimene industrial resins, Lauxein and Lauxite adhesives, Vuepak cellulose acetate and sheet materials, and surface coatings.

## Royal Rubber Expands

An expansion into the manufacturing of custom moldings and industrial specialty rubbers has been announced by Royal Rubber Co., South Bend, Ind. Previously involved only in the fabricating phases of rubber products, the company recently enlarged its plant facilities and is reorganizing its distribution system to include locations outside of South Bend.

Paralleling this material expansion has been the addition of two key men. Clem D. Easly, former chairman of the molded, extruded, and lathe cut division of The Rubber Manufacturers Association, Inc., is now in charge of sales and distribution. John T. Poffenberger, an experienced chemist in production and specialty manufacture, has been named plant manager.

**Research Instrument Co.** has been appointed Ohio sales representative by Tinius Olsen Testing Machine Co., Willow Grove, Pa. With offices at 12410 Triskett Rd., Cleveland, Research Instrument will handle the entire line of Olsen physical testing equipment for the state of Ohio, except for several counties adjacent to Pittsburgh.



*All photos, Madison Geddes, Cleveland*

Claude H. Alexander — Robert J. Wolf — Benjamin M. G. Zwicker

Edward F. Wagner

## BFG Chemical Ups Three

Robert J. Wolf has been appointed director of development at B. F. Goodrich Chemical Co.'s Avon Lake, O., experimental station; and in the Rose Bldg., Cleveland, O., headquarters office Claude H. Alexander has been named coordinator of technical service; while Benjamin M. G. Zwicker has been appointed coordinator of product development.

Dr. Wolf received his Ph.D. in chemical engineering from Case Institute of Technology in 1942 and taught at Princeton University prior to serving 3½ years with the Navy. He joined Goodrich Chemical in 1946, holding various positions in Geon polyvinyl chloride resin development until his appointment as manager, sales development laboratory, in 1952. He will now supervise all technical activities at the large station.

Mr. Alexander started with the company in Akron, O., as a chemist in 1930. He filled several technical positions until 1943, when he was promoted to technical manager of polymer development. He was transferred to the Cleveland office in 1946 as a staff representative of the vice president, technical, a post he has held until now.

Dr. Zwicker came to The B. F. Goodrich Co. in 1940 as a research chemist. He became technical manager, development, of the Akron experimental station in 1943 and was made manager of that station in 1948. Since 1950, Zwicker has been technical analyst for development programs of Goodrich Chemical.

## Timken President Returns

William E. Umstattd, president of The Timken Roller Bearing Co., Canton, O., recently returned from a tour of Europe where he visited the company's plants and sales offices. Mr. Umstattd, commenting on the economic situation in that area, was enthusiastic over the recovery of West Germany, but fearful of the future for France and Italy, regarding a period of complete reorganization necessary if these two countries are to attain any kind of stability. The major obstacle to genuine European recovery, however, is considered to be the restrictions on business imposed by import licenses, it is Mr. Umstattd's belief.

## Painted Floor Matting

A new, patented method of spray painting rubber floor matting and stair treads has been devised by Boston Woven Hose & Rubber Co., Cambridge, Mass. Conceived in an attempt to eliminate the uneven wear of color that occurs on spray-painted matting, the new system compensates for the gradation in coating thickness between the center and the edges of a sprayed width by giving the less thick areas on either side of the center of traverse a second coat of paint. This is accomplished by permitting an overlap of the thinly coated area of one pattern with a similarly coated area of a second pattern. Uniform wear resistance and longer lasting service for the colored matting are expected to result from this type of processing.

### Floor Matting Sample Book

In order to aid the sale of colored rubber floor matting at the point of purchase, a book containing actual samples of available matting has been designed by Boston Woven Hose. The samples, mounted to permit examination of the back, are supplemented by specifications concerning patterns of corrugations, sizes, and types of backing for the various types of matting.

## Glycol Price Reductions

Two glycols, 1,4-butanediol and 2-butyne-1,4-diol, produced by General Aniline & Film Corp., New York, N. Y., have been reduced in price for carload lots to 40¢ a pound and 13¢ a pound, respectively. The price reduction for the latter compound is for the 35% aqueous solution.

Both materials are derived from acetylene by high-pressure processes. The materials are widely used as chemical intermediates for plasticizers, plastics, etc.

**Ace Rubber Products, Inc.,** Akron, O., has appointed Charles N. Jenkins, sales manager. He was formerly assistant sales manager. Mr. Jenkins, a veteran of seven years with Ace, has assumed full responsibility for sales, advertising, and promotion of the firm's rubber floor coverings.

## Witco Promotes Wagner

Reassignment and extension of executive duties to integrate chemical operations in the area served by its Chicago plant have been announced by Witco Chemical Co., 260 Madison Ave., New York, N. Y.

Edward F. Wagner has been appointed manager at Chicago and will contiue also as director of the technical service department.

W. B. Pings will be assistant director of technical service, retaining also his position as director of the plant laboratory.

John V. Roach remains plant superintendent.

Dr. Wagner, prior to joining Witco in 1945, served as chemical engineer with Standard Oil Co. of Ohio.

## Stokes Absorbed into Parent

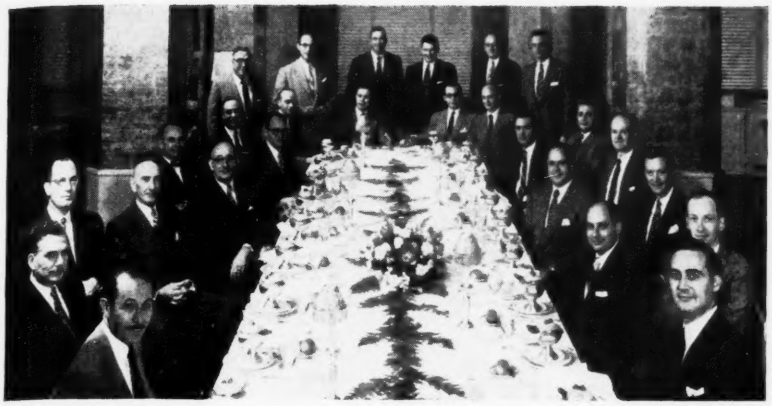
Stokes Molded Products, Inc., a wholly owned subsidiary of Electric Storage Battery Co., Trenton, N. J., has been merged into the parent corporation as a division. The assets and the liabilities of Stokes have been assumed by its parent, but its managing and operating personnel will continue with the same responsibilities as before.

## St. Joe Representative

The recently appointed sales representative for lead-free zinc oxides of St. Joseph Lead Co., 250 Park Ave., New York 17, N. Y., is L. H. Butcher Co., 15th and Vermont Sts., San Francisco 1, Calif. The sales company will serve the Bay area, with both carload and less-than-carload lots.

## Baby Nipples of Silicone Rubber

Silicone rubber is being molded into baby nipples which reportedly will not clog or get limp and which will last longer than the conventional rubber articles in general use, according to General Electric Co., Pittsfield, Mass., producer of silicone rubber. Large-scale manufacture of the nipples, however, will not begin until established nipple firms decide that sufficient demand exists for the more costly product.



**H. Muehlstein *(Fourth from Left)* and Personnel Involved in Stock Plan at Recent Testimonial Dinner at Waldorf Astoria Hotel**

**Donald A. Comes**

## Muehlstein Personnel To Purchase Stock

A group of 24 officers, branch managers, and key employes of H. Muehlstein & Co., Inc., 60 E. 42nd St., New York 17, N. Y., will be permitted to purchase "a very substantial portion" of the corporation's common stock in accordance with a recently conceived plan. This policy was instituted, according to H. Muehlstein, president and chairman of the board, "to insure the continuity and the perpetuation of the business and the policies" of the firm's present management. The stock of the corporation, which was founded by the president in 1911, is privately held.

H. Muehlstein & Co., Inc., a leading supplier of raw materials to the rubber and plastics industries, is international in scope, with subsidiaries in Canada and England and large facilities in Europe and the Far East. The firm carries on an annual business estimated in the range of $50,000,000.

## BWH Adds Three to Staff

Boston Woven Hose & Rubber Co., Cambridge, Mass., last month announced several executive appointments.

Eugene W. Caton has been taken on as product development manager, tubing and extrusion. He was for six years chief chemist with the Pawling Rubber Corp. and is also a member of the executive committee of the New York Rubber Group.

A. Cushing Cutler has been signed up as sales manager, shoe products. He most recently was treasurer of Alfred Hale Rubber Co., with which he had been associated 25 years.

George A. Ryan has been named sales engineer for the BWH plastics division. For the past 12 years he was with Irvington Varnish & Insulator Co.

## Snell Advances Two

The promotions within Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., of Shepherd Stigman to assistant to the director of personnel and public relations, and of Fortuno De Angelis to assistant to the director of market research have been made public. Mr. Stigman joined the company as a radiochemist in 1951 after having held positions with Container Corp. of America and Brookhaven National Laboratory. Mr. De Angelis started with Snell in 1952 as a chemist.

## Furnace Black's Tenth Anniversary

Furnace oil carbon black, the reinforcing ingredient that was instrumental in making possible the use of synthetic rubber for tire treads, observed its tenth birthday on Christmas Day, 1953. Ten years earlier, with the nation at war and cut off from the natural rubber supply, the first shipment of furnace oil black was made from the Borger, Tex., plant of Phillips Petroleum Co.

Following the end of the war when imports of natural rubber threatened the synthetic rubber industry, Phillips introduced further improvements in this carbon black which enabled the synthetic product to compete successfully with natural rubber. For this development and for its major contributions to cold rubber technology, the company received the 1951 Award for Chemical Engineering Achievement.

## Safety at Barrett

A total of more than 7,600,000 man-hours worked without a lost time accident has been recorded by the Barrett Division of Allied Chemical & Dye Corp., 40 Rector St., New York, N. Y. Of the five plants involved, all of which exceeded the 1,000,000 man-hour mark, the Frankford, Philadelphia, plant headed the list with more than 2,200,000 man-hours in this category.

Speaking of the record of the Frankford facility, C. J. Murphy, works manager, noted that the company "builds safety into every new plant, often at a cost of hundreds of thousands of dollars. During the past few years, the entire Frankford plant has been equipped with the most modern fire protection equipment available," including sprinkler systems, large water mains, more than 10,000 feet of hose, hundreds of fire extinguishers, and a supplementary 600,000-gallon water-tank reservoir.

## GE Sales Up 15%

The chemical division of General Electric Co., Pittsfield, Mass., increased its sales to customers other than the parent company by 15% during 1953. Further improvements in sales volume for 1954 is predicted, particularly in such areas as silicone products, mica mat, and decorative laminates, notwithstanding the general softening of business in late 1953.

## Comes Succeeds Hitchcock As F-B Sales Manager

Carl Hitchcock, vice president and general sales manager of Farrel-Birmingham Co., Inc., Ansonia, Conn., has retired. Named to succeed him as general sales manager is Donald A. Comes, formerly assistant general sales manager.

Mr. Hitchcock joined the sales department of Farrel Foundry & Machine Co. following his graduation from Yale University in 1911. He was elected assistant secretary and a member of the board of directors of that company in 1918, and, following the firm's merger with Birmingham Iron Foundry in 1927, he became sales manager of the Ansonia and Derby plants. In 1930 he was elected vice president and became general sales manager in 1944.

Mr. Comes joined Birmingham in 1922 and for many years handled the promotion and sale of the Banbury mixer. He became manager of the mixer division in 1943 and was promoted in 1946 to the position from which he has recently been elevated.

## Clements Succeeds Feely

Ohio Rubber Co., a division of The Eagle-Picher Co., Willoughby, O., has appointed J. D. Clements as purchasing agent to replace C. L. Feely. Mr. Clements has served in purchasing capacities with Square D Co., American Metal Products Co., and Ford Motor Co. In this last, most recent position he was concerned with the purchase of production parts for Ford's M-48 tank program.

## Glass Research Lab

Basic and applied research will be carried on by the Pittsburgh Plate Glass Co., Pittsburgh, Pa., at a laboratory proposed for construction on a 45-acre tract of land near Pittsburgh. No date for construction of the building has been set.

The glass research program of the firm is being reorganized and expanded under the director, S. F. Cox. The program has been divided into two sections: development and product control, headed by E. L. Fix; and basic and applied research, under the supervision of J. E. Archer.

## Special Stockholders' Meeting

Indications are that sales of United States Rubber Co., Rockefeller Center, New York 20, N. Y., will be between $830,000,000 and $835,000,000 for 1953, and net earnings will probably be equivalent to about $5 a common share, H. E. Humphreys, Jr., president, declared December 29 at a special stockholders' meeting in New York. Sales for 1952 were $850,000,000, and earnings per common share, $4.33.

Stockholders approved a modification of the company's retirement and disability allowance plan which will raise minimum retirement benefits for employes with 25 years' service from $100 to $125 a month. The increase is in accord with the agreement reached by the rubber company and the United Rubber, Cork, Linoleum & Plastics Workers of America, CIO, on September 28, 1953.

#### Bonn Assigned to Washington

Douglas K. Bonn has been named to head the company's government department in Washington, D. C. Mr. Bonn, assistant manager of the department since 1952, succeeds Joseph E. Mathie, who had managed the department from January, 1950, until his death in November, 1953. Mr. Bonn joined U. S. Rubber in 1937 as a statistical clerk in the tire division's Baltimore branch. The following year he became assistant to the district sales manager and, in 1942, was transferred to the war products division as a special representative to service government contracts. In 1945, Mr. Bonn moved to the Washington office, renamed the government department after World War II.

#### Greenan and Wolfe in New Posts

Appointment of Thomas F. Greenan, Jr., as operating manager of the Denver branch and Charles E. Wolfe as operating manager of the Phoenix branch was announced recently.

Formerly assistant operating manager of the Detroit branch, Mr. Greenan first joined U. S. Rubber in 1945 following his discharge from the Navy.

Mr. Wolfe, who came to the company after his discharge from the Army in 1945, was formerly warehouse superintendent in the Los Angeles branch. His position is a newly created post, with expansion of the Phoenix branch services. Presently located at 808 North First St., as a sales office, the branch will soon move into larger quarters in a new building at 1140 N. 22nd St.

#### Promotions in Mechanical Goods

A series of changes in the sales organization of the mechanical goods division of U. S. Rubber also has been released by the company.

Henry E. Pruner has been made manager of conveyor and elevator belting sales to replace George C. Crabtree, now assistant district sales manager of the New York sales branch. Mr. Pruner has been with the company for nine years as a sales engineer at the Chicago branch.

New district sales managers in the firm's Buffalo and Boston branches were also named. Philip J. Guilfoil, the new Buffalo manager, will transfer from the New York branch where he has been a salesman since 1945. N. Walter Swenson, assistant district sales manager in New York, will take over the Boston office. Mr. Swenson succeeds William G. Mueller, who has been given a special assignment in the New England area.

## Machine Tool Representative

Carl Hirschmann Co., Inc., Manhasset, N. Y., exclusive representative for the sale and service of high-precision machine tools made by the West German firm of Nassovia Maschinen-fabrik Hanns Fickert G.M.B.H., is currently demonstrating fully automatic die sinkers, reciprocating filling and sawing machines, punch forming and shaping machines, and cutter grinding and rounding machines at its Great Neck, L. I., facility. The demonstration, directed toward the rubber and the plastics fabricator who uses dies, molds, etc., will run until the latter part of this month.

## Plastics Manager Named

The new plastics division plant now being built for Seiberling Rubber Co. in Newcomerstown, O., will be headed by C. F. Biggs, according to an announcement from the company. Mr. Biggs will act as a field engineer during the construction work and will be in charge of the plastics operation at the facility when it begins in the summer. With Babcock & Wilcox Co. before joining Seiberling in 1946, Mr. Biggs has held company posts of mat mold designer, quality control engineer, and foreman and has recently been assigned to special engineering problems.

## New Firestone Officers

The election of Raymond C. Firestone and J. E. Trainer to the newly created positions of executive vice presidents of The Firestone Tire & Rubber Co., Akron, O., and the reelection of all other officers of the company were made public recently. Those again elected include: Harvey S. Firestone, Jr., chairman; L. R. Jackson, president; J. J. Shea, H. D. Tompkins, and H. M. Taylor, vice presidents; H. H. Hollinger, treasurer; J. Thomas, secretary and general counsel; C. A. Pauley, comptroller; E. H. Schulengerg and W. D. Zahrt, assistant treasurers; H. S. Brainard, assistant secretary; and T. F. Doyle and L. A. Frese, assistant comptrollers.

## Tall Oil Product Expansion

Separating and refining facilities of the Panama City, Fla., plant of Arizona Chemical Co. will be increased by 2½ times, according to Arizona, a jointly owned subsidiary of American Cyanamid Co. and International Paper Co. The major portion of this increase will be in tall oil fatty acid and tall oil rosin production. Since the latter product is the only tall oil rosin admitted under the Naval Stores Act, this expansion is expected to assure present and potential industrial users larger supplies at stable prices.

## Elections at Kuehn

The annual election of officers of N. L. Kuehn Co., Milwaukee, Wis., maker of mechanical rubber products, saw the reelection of N. L. Kuehn as president and H. W. Luedke as vice president and general manager. In addition, the company has acquired the services of Donald N. Kuehn, recently discharged from army service, as a director and assistant vice president.

## Goodyear Appointments

F. S. Griesinger has been appointed manager of the retread and repair materials department of the tire division at Goodyear Tire & Rubber Co., Akron, O. Formerly manager of tube sales in the auto tire department since 1940, Mr. Griesinger has been with Goodyear since 1916, as sales manager of the St. Louis, Chicago, Des Moines, and Kansas City districts. In his new position he replaces V. L. DeCamara who was transferred to the Cleveland, O., district.

#### New Headquarters at Oklahoma City

Goodyear has moved into its modern new district office and warehouse building at 34th St. and Lincoln Blvd., Oklahoma City, Okla., according to R. G. Miller, local district manager, who also said the company's growing sales in tires and other products made the expansion move necessary. The old offices were at 913-15 Broadway.

With 52,000 square feet of floor space, the new building is one story high, has a frontage of 181 feet and depth of 298 feet. It is on a plot 225 by 600 feet, providing ample room for future expansion. All the office area is air-conditioned, and the surrounding grounds, except for the paved 50-car parking area, will be attractively landscaped.

A siding of the Santa Fe railroad extends along the south side of the building, with space for four cars to load and unload at the same time. On the north side is a truck loading dock, accommodating six trucks simultaneously.

## New Assignments at Goodrich

I. Newton Kimsey, John M. Cooney, and Harold L. Larson have been named to new positions within the B. F. Goodrich Co. Industrial Products Division, Akron, O.

Mr. Kimsey has been appointed sales development manager of the Division. A member of the Goodrich organization since 1922, he has served as manager of the Akron sales district, field sales manager, and western division manager.

Mr. Cooney, with the company since 1932, is the new western zone manager. Manager of the Akron sales district until this promotion, he had previously served as manager of the Boston sales district.

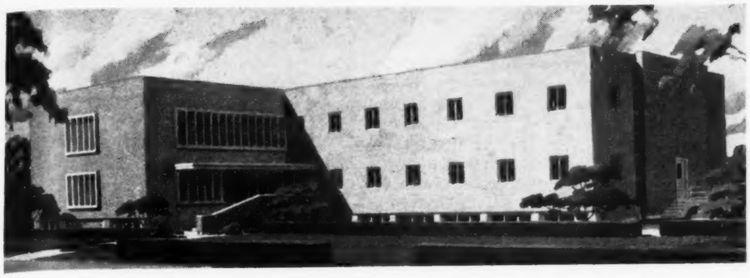
Mr. Larson replaces Mr. Cooney as manager of the Akron sales district. He has been a member of the Akron sales force for the past five years.

## Fouche and Walbeck Upped

J. A. Fouche has been appointed assistant general sales manager for Seiberling Rubber Co., Akron, O. He formerly was manager of advertising and merchandising for the company and as such will be replaced by John J. Walbeck, manager of passenger tire sales.

Fouche joined Seiberling in 1945 in the diversified products sales department and became assistant manager, then manager of the department. In 1948 he moved to the advertising department and became manager that December. Earlier, Fouche had worked for the Firestone Tire & Rubber Co. and The General Tire & Rubber Co. in Akron.

Walbeck, who came to Seiberling's advertising department from the Goodyear Tire & Rubber Co., was named assistant advertising manager in 1950 and passenger tire sales manager last year.



Architect's Drawing of New Emery Research Center

## Emery Research Center

Construction of an $800,000 research center to provide new and larger quarters for the departments of basic research, development, and chemical engineering of Emery Industries, Inc., Cincinnati, O., was begun last December at a site adjacent to the company's present facilities. The center will consist of a two-story brick structure and, upon completion in late 1954, will contain 30,000 square feet of floor space.

Designed to permit further expansion if required, the L-shaped unit will house 28 individual laboratories in one wing and research executive offices, library, and conference rooms in the other. Several application labs will be in the basement, such units to be supplied with equipment to evaluate on a plant scale the various products of the company. Approximately 100 persons will be accommodated in the new structure, with some 150 additional employes required if subsequent wings are constructed.

## Hewitt Advances Several

Two executive promotions were announced January 7 by Austin Goodyear, vice president and general manager of the rubber and conveyors divisions of Hewitt-Robins, Inc., Stamford, Conn. The appointees are F. L. Griffith, Jr., named to the newly created post of general sales manager of the rubber and conveyors divisions, with headquarters in Stamford, and F. W. Blanchard, promoted to the new position of manager of operations of the industrial rubber division in Buffalo.

Mr. Griffith was formerly assistant to the general manager of the industrial rubber and conveyors divisions. He joined the company in January, 1949, as supervisor of time study and methods in the Restfoam plant at Buffalo and later served as plant superintendent of the company's conveyor division at Passaic, N. J.

Mr. Blanchard came to Hewitt-Robins in 1936 as an engineer and draftsman in the industrial rubber plant at Buffalo, subsequently becoming plant engineer, chief engineer, and, in 1945, factory manager. Mr. Blanchard gained widespread recognition during World War II as inventor of an improved process for manufacturing fuel cells, the self-sealing gas tanks used for military aircraft. As manager of operations at Buffalo, Mr. Blanchard will be responsible for the product sales group as well as research and development, purchasing, and manufacturing.

John W. Pew, district manager for the Houston sales area of Hewitt-Robins, has been made manager of the seven-state south central sales division, with headquarters in Houston.

R. E. Johnson, field engineer in the company's Virginia district, has been appointed manager of the Houston district, reporting to Mr. Pew.

The latter began with Hewitt-Robins in 1936 as an inspector at the Buffalo plant. Following service in the United States Army, he returned to the company in 1945 as a field engineer and in 1951 was made manager of rubber and conveyor sales for the Houston district.

H. C. Heine, assistant manager of the central sales division, in Chicago, has been named manager of sales to independent distributors and will be transferred to the company's executive offices in Stamford. L. C. Holloman succeeds Mr. Heine in Chicago.

Mr. Heine started his business career with the Quaker Rubber Corp., but joined Hewitt-Robins in 1950 as district manager in Chicago. The following year he became assistant divisional manager.

James E. Van Stone has been appointed district manager of conveyors and rubber sales in the company's Salt Lake City district. He has been transferred from Los Angeles, where he had joined Hewitt in 1946 as district manager after serving in the U. S. Army.

The company's Salt Lake district includes the states of Utah and Arizona and sections of Montana, Idaho, Wyoming, Nevada, New Mexico, and Texas.

## Allied Polyethylene Plant

A new plant for the production of polyethylene from ethylene derived from fuel oil has been put in operation at Tonawanda, N. Y., by the Semet-Solvay Petrochemical Division of Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. Called the Niagara River petrochemical plant, the new facility has an estimated capacity of 20,000,000 pounds annually. Lummus Co. designed and constructed the ethylene-producing unit; while the engineering division of Semet-Solvay designed the plant for the manufacture of polyethylene.

## Koblegard Succeeds Nelson

Thorne F. Koblegard was elected to succeed the late Oscar Nelson as president of United Carbon Co., Charleston, W. Va., at a meeting of the board of directors on December 17. Mr. Koblegard, formerly first vice president of United Carbon, was also elected president of the company's subsidiaries, which include United Producing Co., Inc., and United Carbon Co., Inc.

Oscar Nelson, Jr., was at the same time elevated to the chairmanship of the executive committee of the company. Mr. Nelson has been executive vice president of the company and its subsidiaries for several years.

Mr. Koblegard was closely associated with the late Mr. Nelson throughout the latter's career. With Mr. Nelson, Sr., and T. A. Whelan, treasurer of United Carbon, Mr. Koblegard formed the Cosmos Carbon Co. and later, in 1925, the United Carbon Co. of today.

## New Officers for Neville

Neville Chemical Co., Pittsburgh, Pa., has elected Lee V. Dauler president and D. W. Kelso vice president. Mr. Dauler was formerly vice president; while Mr. Kelso retains his former post of treasurer.

Edwin Hodge, Jr., formerly chairman of the board and president, continues as chairman; and John C. Bane, Jr., remains secretary and assistant treasurer.

W. F. Eberle and R. E. Dingleberg were elected as assistant secretary and assistant treasurer, respectively.

## McHugh in New Post

Three appointments at the Passaic, N. J., plant of Raybestos-Manhattan, Inc., Manhattan Rubber Division, were announced last month by J. H. Matthews, executive vice president.

C. P. McHugh, formerly manager of the roll and tank departments, is now assistant director of research and product design, working with W. L. White, director, in Manhattan's laboratories. Mr. McHugh has been with the company 23 years and previously had been connected with the laboratories.

S. F. Horesta, assistant manager of the roll and tank departments, succeeds Mr. McHugh as manager. Horesta started with Manhattan Rubber 28 years ago.

E. D. Hines, sales engineer in the tank department, becomes assistant manager. Mr. Hines came to the company in 1934.

**Among Those Attending the Recent Annual Sales Meeting of Baker Castor Oil Co., New York, N. Y., Were *(Left to Right: Top Row:)* John W. Hayes, Marivn C. Rasmussen, J. C. Kay, E. M. Sterling, C. R. Swenson, R. L. Vignolo, L. Jubanowsky, and J. F. O'Brien; *(Seated:)* B. H. Cogswell, John Ottens, R. E. Rulison, H. H. Fritts, and J. G. Phillips**

## New Posts at Shell

Two new head office posts, both reporting directly to the manufacturing vice president, C. W. Humphreys, have been set up by Shell Chemical Corp., 50 W. 50th St., New York 20, N. Y. B. M. Downey, manager of the company's plant at Houston, Tex., has been appointed manager of manufacturing, and A. W. Fleer, manufacturing operations manager, has been named manager of research, development, and engineering.

Mr. Downey joined Shell in 1925 as a laboratory helper and rose to the position of plant manager of the Dominguez, Calif., plant in 1941 and plant manager of the Houston plant in 1946. In his new capacity Mr. Downey will have the managers of six plants reporting to him and will be in charge of the head office manufacturing operations and industrial hygiene departments.

Dr. Fleer, a chemical engineer, started with Shell in 1935. In 1944 he became technical assistant to the president of Shell Development Co. and was appointed manager of manufacturing operations for Shell Chemical in 1952.

## Value of Supervisory Personnel

High-caliber, well-trained supervisory personnel are essential if industry is to have highly productive workers. This belief and its ramifications were discussed by J. E. Trainer, vice president and director of The Firestone Tire & Rubber Co., Akron, O., in a talk reprinted in the January-February issue of *Ordnance*, the official magazine of the American Ordnance Association.

"Although the basic principles of a sound management-labor relations program are simple," he declared, "their practice on the large scale required in industries today is sometimes difficult because of the vagaries of human nature."

Highly productive workers are obtainable, however, if well-trained, high-caliber supervisors are impressed with the necessity of cooperating with employes. Findings of missions from other countries studying productivity in the United States were cited by Mr. Trainer to show that American labor attitudes are more important for superior productivity than are technological reasons. Finally, the conscription of labor for industry in any degree will increase the need of good management-labor relations if maximum production is to be achieved, he said.

## Corcoran Succeeds Siverd

Ray L. Corcoran has succeeded Clifford D. Siverd as eastern regional sales manager, according to L. Sklarz, sales manager, pigments division, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

Mr. Siverd has been appointed assistant to the general manager of the division.

Mr. Corcoran joined the former United Color & Pigment Corp. in 1929. He obtained his early training in pigment coatings in the production and sales service laboratories and in 1931 was made a pigment sales representative in the New York Metropolitan Area.

Mr. Siverd started with United Color in 1935. He was named to the sales staff in 1938 and in 1948 became eastern regional sales manager of the pigment department. From 1941-1945, however, he served with the Armed Forces.

## Industrial Ovens Reorganizes

The reorganization of Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland 11, O., plans for which were made a year ago, was completed recently with changes in personnel and in manufacturing facilities. Howard R. Richards has been elected president and general manager; Sloane E. Allen is vice president and treasurer; Louis A. Litzler is secretary; E. W. Baumgardner has been appointed sales manager; and A. V. Alexeff is now chief engineer.

The manufacturing changes include the institution of a registered engineering consulting service and the construction of a completely equipped structural steel fabricating and machine shop. Addition of a sheet metal shop is planned for the near future. These changes are expected to aid the company in its function of manufacturing and installing continuous materials handling and processing systems.

## Organizational Changes at Diamond Alkali

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O., has announced three major changes in the organizational structure of the company: establishment of a chlorinated products division, establishment of a plastics division, and appointment of a new works manager at the Houston, Tex., plant. The former plastics and agriculture chemicals division has been abolished. Each of the new divisions will operate autonomously, assuming all sales, research, and plant manufacturing responsibilities under the direction of a general manager who will function from the Cleveland office.

A. L. Geisinger, vice president of the company, has been named general manager of the plastics division. C. E. Lyon, vice president and works manager at Diamond's Houston plant, has been appointed to head the new chlorinated products division. Succeeding Mr. Lyon as Houston works manager is Frank Chrencik, previously assistant works manager there for six years and, earlier, superintendent of Diamond's Edgewood, Md., electrochemical plant.

The chorinated products division will employ the services of Bruce D. Gleissner as assistant general manager of the division, and L. J. Polite, Jr., as sales manager of agricultural chemicals. Both men will be stationed in Cleveland.

Mr. Gleissner, former manager of the insecticide department of American Cyanamid Co., will be concerned with furthering the commercial development of agricultural chemicals in all phases of activities except sales.

Mr. Polite had previously been assistant sales manager at the company's eastern plant in Newark, N. J.

### Pierce Joins Diamond Alkali

David E. Pierce, chemical engineering consultant, author, and lecturer, has been appointed to the newly created post of director of manufacturing control at Diamond Alkali Co., Cleveland, O. Mr. Pierce has in the past been employed by Rohm & Haas Co., General Aniline & Film Corp., Atlantic Refining Co., and E. I. du Pont de Nemours & Co., Inc., and is the author of two books on the subject of chemical plant production and supervision. In his new position Mr. Pierce is directing his attention primarily to problems involving the appraisal and analysis of current manufacturing operations at Diamond's plants.

## Conveyor Belt Developments

Two new changes concerning conveyor belts, the first dealing with the construction of the belt itself, and the second with construction of breaker strips, have been announced by United States Rubber Co., Rockefeller Center, New York 20, N. Y. Both involve the use of synthetic fibers in place of cotton.

The use of rayon instead of cotton duck in the manufacture of belts reportedly provides lighter-weight units of strength equal to that of the conventional products. More resistance to ripping or tearing, better gripping of fasteners, and the expenditure of less power to operate are other advantages claimed for the rayon belt. In addition, use of the rayon fiber in the cross-wise direction provides the belt with greater flexibility and troughability. These rayon belts will be marketed under the trade names, U. S. Matchless and U. S. Giant.

Nylon combined with cotton is being used as a replacement for the all-cotton cord previously used in breaker strips. The new strips, called "Nyton," employ nylon in the warp or lengthwise direction and cotton in the filler or crosswise direction. This modification permits greater flexibility for the belt along its length. Another change incorporated into the new product is the addition of more cotton in the filler to increase resistance to gouging and tearing on the surface cover. The "Nyton" breaker will be available in all U. S. heavy-duty conveyor belts where severe service is expected, including the Matchless and the Giant.

## Management Ratings

Five companies in the rubber industry have been certified as "excellently managed" by the American Institute of Management, a non-profit organization in New York, N. Y. Four of the rubber firms received the award for the fourth consecutive year. These were The B. F. Goodrich Co., The Goodyear Tire & Rubber Co., and The Firestone Tire & Rubber Co., all of Akron, O., and Raybestos-Manhattan, Inc., Passaic, N. J. The fifth company so honored, United States Rubber Co., New York, received the designation once before.

Of some 3,000 leading organizations in the United States and Canada whose methods were studied, only 348 were found eligible to receive recognition this year. The system used by the Institute in determining the rating of a company is based on ten key factors: economic function, corporate structure, health of earnings growth, fairness to stockholders, directorate analysis, research and development, fiscal policies, production efficiency, sales vigor, and executive evaluation. The stated purpose of these awards is to focus attention upon those companies whose practices should be emulated by others.

## Luna, AW&C, Speaks

E. F. Luna, director of sales promotion for Anaconda Wire & Cable Co., New York, N. Y., recently addressed the regular monthly meeting of the Passaic County Electrical League on the anticipated wiring modernization market. Mr. Luna discussed the recent campaigns of his company, Full Power Ahead and Power Up, which are intended to help contractors, distributors, and utility company executives promote the replacement of present wiring systems with new ones.

## Employe Suggestions at Firestone

A total of $82,872 was paid to employes of the Firestone Tire & Rubber Co.'s 25 plants for some 3,749 suggested ideas that were adopted in 1953. This figure represents an increase of nearly 40% over that of the previous year.

(The total amount of money paid to workers in all industries for suggestions in 1953 was reported to be $7,000,000, an increase of nearly 17% over the 1952 amount.[1])

As the largest one-year amount ever awarded to Firestone employes in the 36-year history of the company's suggestion system, the figure is indicative of the high degree of participation in the program. Ideas on improvement in production, sales, and office operations numbered 12,191 for an average of 301 suggestions per 1,000 employes. Awards are made in proportion to the yearly saving realized from the suggestion or to the intangible benefits in safety and working conditions that may result.

One award of $3,000, one of $2,000, and two of $1,000 were the highest renumerations made. The largest sum was paid to an employe for a suggestion on improving the manufacturing process for aircraft cells. The $2,000 was given for an idea on an improved method of finishing tires.

[1] See our Jan., 1954, issue, p. 510.

## Sales Changes at Republic

The appointments of James M. Hughes as manager of distributor sales and of Henry L. Lunger as manager of automotive and appliance sales of the Republic Rubber Division of Lee Rubber & Tire Corp., Youngstown, O., have been announced by the company.

Mr. Hughes, previously with Goodyear Tire & Rubber Co. and Pennsylvania Rubber Co., joined Republic in 1949 as sales development manager in charge of advertising, sales promotion, and sales training.

Mr. Lunger, a member of the company for the past 18 years, was in charge of inside sales of automotive and appliance products before this promotion.

**Sid Richardson Carbon Co.,** Fort Worth Club Bldg., Fort Worth 2, Tex., has appointed Wyrough & Loser, Trenton, N. J., its agent in the Middle Atlantic States area, including the eastern half of New York State and the northeastern part of Virginia. Warehouse stocks of Texas channel blacks will be maintained at Trenton as a service to l.c.l. buyers.

**Carbide & Carbon Chemicals Co.,** a division of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y., has appointed the following assistant district managers for the sales offices of their respective areas: G. E. Kuehn and J. K. Marshall, New York; J. J. Berry, Chicago; H. H. Noren, Cincinnati; G. E. Bernard, San Francisco; and H. E. Klein, St. Louis.

**D. H. Litter Co., Inc.,** 114 E. 16th St., New York 3, N. Y., has been appointed representatives for the sale of Wollastonite to the paint, floor covering, and allied industries in the Metropolitan New York Area. The calcium metasilicate is a product of the white pigments division of Godfrey L. Cabot, Inc., Boston, Mass.

**C. C. Baldwin, Jr.,** has been assigned to the Akron sales and technical service office of Hercules Powder Co. Mr. Baldwin, a chemical engineer, joined the company as a salesman directly after graduation in 1950.

# OBITUARY

## Ames B. Hettrick

AMES BARTLETT HETTRICK, 49, of 593A E. Front St., Plainfield, N. J., died suddenly last month. He was an executive of American Cyanamid Co., with which he had been associated for nine years. Only recently he had been appointed assistant manager of its newly formed pigments division.

Educated at Massachusetts Institute of Technology in engineering administration, Mr. Hettrick had been closely identified with the development of titanium dioxide pigments. He joined Stone & Webster Engineering Corp. in 1928, and in 1931, Southern Mineral Products Corp. as chief engineer; he became plant manager in 1934. When this company was purchased by Virginia Chemical Corp. in 1936, the deceased was made vice president and general manager of the new organization. Upon the acquisition of Virginia Chemical's titanium interests by Cyanamid's Calco Chemical Division in 1944, he became works manager of the Piney River, Va., plant operation. In 1946, Mr. Hettrick was made assistant manager of manufacturing for Calco Chemical.

He was born in Clinton, Iowa, and received his early education in East Bridgewater, Mass.

He was an active member of the American Society of Mechanical Engineers and American Institute of Mining & Metallurgical Engineers; was an associate member of the American Institute of Chemical Engineers; and a member of Phi Mu Delta, Pi Delta Epsilon, the Chemists Club of New York, and the Plainfield, N. J., and Farmington, Va., Country clubs.

Surviving are his wife, his mother, three sons, and a brother.

Funeral services were held on December 30 at Grace Episcopal Church, Plainfield.

## Earl F. Jackson

EARL F. JACKSON, 77, Goodyear Tire & Rubber Co.'s first Detroit district and division manager and a pioneer in original equipment sales, died recently at Detroit.

One of America's best bicycle racers in his youth, Mr. Jackson was hired by Goodyear to head its Detroit operations in 1907 because of his wide acquaintance with bicycle and carriage makers that were changing over to automobiles. Until his retirement in 1937 he devoted most of his time to manufacturers sales. His pioneering in this field paved the way for the entire pattern of present-day manufacturers sales by Goodyear.

Mr. Jackson was a manufacturers agent at Detroit for several years after leaving Goodyear and for the past 10 years has been in complete retirement.

He is survived by his wife and a daughter.

## Charles Berlow

CHARLES BERLOW, of the consulting firm of Berlow & Schlosser Co., Providence, R. I., died suddenly on January 13 of acute coronary thrombosis.

He was born in Boston, Mass., on July 17, 1897.

After graduation from Northeastern University in 1919 as a chemical engineer, Mr. Berlow was with Dr. Lothar E. Weber as a chemist until 1923, when he joined Fisk Rubber Co. In 1924 the deceased went to American Wringer Co. and rose to the position of technical superintendent and factory manager. In 1942 he became associated with Boston Woven Hose & Rubber Co., where he remained one year. He was chief chemist and technical director of Carr Mfg. Co. until 1945, when he formed the consulting firm of Berlow & Schlosser.

Mr. Berlow was very active in many organizations. A charter member of the Rhode Island Rubber Group, he held the offices of secretary-treasurer, president, and director in that organization. He was also a member of the Boston Rubber Group, the Connecticut Rubber Group, and the American Chemical Society, and the Masons.

Funeral services were held January 14 at Providence, R. I., with interment in Everett, Mass.

Surviving are his wife, three daughters, and three grandchildren.

## John T. Crowley

A HEART attack on January 10 took the life of John T. Crowley, 79, vice president and a director of Servus Rubber Co., Rock Island, Ill. Mr. Crowley, a resident of New York, N. Y., was in Rock Island on a business trip when death came.

Active in the rubber footwear manufacturing industry for 64 years, the deceased, who was born in New Brunswick, N. J., began his career with the old Lambertville Rubber Co., Lambertville, N. J. He joined Servus in 1921 and then the United Shoe Co. in 1928, but later returned to Lambertville Rubber. In 1937 he rejoined Servus, becoming vice president of that organization in 1942. At the time of his death Mr. Crowley was in charge of the eastern division of the company.

Requiem Mass was sung in St. John's Catholic Church in Lambertville on January 14, and interment was in the parish cemetery.

Mr. Crowley is survived by his wife, a brother, and two sisters.

## John Van Bodegom

CORONARY thrombosis was the cause of death on November 21, 1953, of John Van Bodegom, 62, machine designer at the Providence, R. I., plant of United States Rubber Co. Born in Paterson, N. J., in 1891, Mr. Van Bodegom was with U. S. Rubber more than 40 years, at one time as master mechanic of the Providence plant.

He was a member of the Masons, J.O.U.A.M., U. S. Rubber Club, Mt. Pleasant Baptist Church, and of the American Society of Mechanical Engineers.

Services for the deceased were held both in Providence (November 23) and in Paterson (November 25). Interment was in Paterson.

Mr. Van Bodegom is survived by his wife and a son.

# NEWS ABOUT PEOPLE

T. A. Haschke

**Theodore A. Haschke** has been appointed director of sales of the newly organized industrial chemical division of Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y., its subsidiaries, and associated companies. Mr. Haschke joined the company in 1926 and became sales manager of the eastern division in 1942, a position he held until this promotion.

**Edward J. Sheridan** has been appointed director of technical sales and development by Carbon Dispersions, Inc., Newark, N. J. For the past seven years Mr. Sheridan was with Sun Chemical Corp. where he was superintendent of the A. C. Horn plant and for the past four years served as general manager of the pigments division. Previously he had worked for Interchemical Corp. for 15 years, specializing in the science and application of pigment dispersions for inks, paints, lacquers, etc. The last three years with Interchemical he was chief chemist at the R. B. H. Dispersions Division, Bound Brook, N. J.

**Robert J. Peters,** assistant to the vice president of The New Jersey Zinc Sales Co., 160 Front St., New York 7, N. Y., has retired from the company after more than 43 years of service. Joining the company in 1910 as a supply house clerk, Mr. Peters rose to the position of chief of the lithopone department, Depue, Ill., in 1924. He became a sales engineer in 1926 and a salesman in the pigment sales department in 1929. He held the post from which he retired since 1951.

**Joseph S. Giegel,** former manager of thread production at the Fall River, Mass., plant of Firestone Tire & Rubber Co., has been named manager of the company's new Venezuelan facility. A veteran of 27 years with Firestone, Mr. Giegel was previously with the Sao Paulo, Brazil, plant from 1940-42, after which he became personnel director at Fall River and then manager of covered rubber thread production. At his new post in Valencia, Venezuela, he will be responsible for the plant's production of tires, tubes, and other products.

**H. W. Rollman,** president of Wellco and Ro-Search, Waynesville, N. C., has left on a three-month trip that will take him some 60,000 miles around the world. Purpose of the tour of Oceania, Asia, Africa, and South America is to sign new agreements for the company's process of footwear manufacture with firms in about 15 countries and to visit existing affiliated factories located on those continents.

**William J. Worrell** has been appointed vice president and general sales manager of The Bearfoot Airway Corp., wholly owned subsidiary and division of The Bearfoot Sole Co., Wadsworth, O. Mr. Worrell, former sales manager of Ace Rubber Products, Inc., will set up a sales and distributor organization throughout the United States and Canada and an export division in Boston. The products to be marketed are microcellular sponge products used in industrial and household fields, and some new materials recently developed.

**M. G. Lucke** has been named superintendent of molded hose, Quaker Rubber Corp., division of H. K. Porter Co., Inc., Philadelphia, Pa. He will be in charge of all molded hose production for the company. His experience includes positions as hose development engineer, molded hose supervisor, and superintendent of hose production for industrial rubber goods manufacturers.

**Alden C. Brett,** treasurer, Hood Rubber Co., Watertown, Mass., has been appointed chairman of the advisory panel on cost justification of the Controllers Institute of America, New York 17, N. Y. The panel will develop recommendations to be transmitted to the recently appointed committee on cost justification of the Federal Trade Commission, having to do with the Robinson-Patman Act.

**Willard W. Millikan,** aviation products representative of Goodyear Tire & Rubber Co. in Washington, D. C., and colonel in the Air National Guard, was presented recently with the company's Litchfield Special Award of Merit in honor of his breaking of the West-East flight record. Colonel Millikan, a triple-ace in World War II, flew an F-86 Sabre Jet coast to coast in a little more than four hours to better the previous record by more than five minutes.

**Roger Adams,** head of the department of chemistry and chemical engineering, University of Illinois, has been appointed to the board of trustees of Battelle Institute, Columbus, O. Internationally known both as a scientist and an educator, Dr. Adams received medals from the United States and British governments for his work during World War II. For his achievements in chemistry, he has been awarded the Joseph Priestley Medal, the Perkin Medal, the Davy Medal, the Elliot Cresson Medal, and many others. Formerly president of the American Chemical Society and of the American Association for the Advancement of Science, Dr. Adams is also active in many other societies both here and abroad.

**Cornelius T. Lyons,** former New England sales representative for Rubber Corp. of America, 274 Ten Eyck St., Brooklyn 6, N. Y., has been appointed head of the recently opened Boston sales office of the company. Location of the new office is the Little Bldg., Room 821, 80 Boylston St., Boston 16, Mass.

**Douglas B. Moore** has been appointed Silastic sales engineer for the Chicago office of Dow Corning Corp., Midland, Mich. Mr. Moore has been associated with Hewitt-Robins, Inc., Pawling Rubber Corp., and Connecticut Hard Rubber Co. In his capacity of assistant technical service manager at the last named firm, Mr. Moore specialized in silicone rubber for two years.

**Thomas J. Herman** has joined the sales staff of Givaudan-Delawanna, Inc., and its associate companies, Givaudan Flavors, Inc., and Sindar Corp., 330 W. 42nd St., New York 36, N. Y. Mr. Herman will service accounts in the territory covered by the Cincinnati branch office. He was in the sales field for five years prior to joining Givaudan.

**Ralph A. Hagberg,** formerly with the industrial chemical sales division of West Virginia Pulp & Paper Co., has joined the S. S. Skelton Co., Cleveland 20, O., a firm which handles a diversified line of chemicals for the rubber and the paint fields. Positions held by Mr. Hagberg, when he was with the paper company, include technical salesman and manager of the Cleveland sales office.

**Alfred J. Northam,** since September 15, 1943, assistant director of the rubber laboratory in Deepwater, N. J., of E. I. du Pont de Nemours & Co., Inc., has been named assistant sales manager for rubber chemicals. Mr. Northam has 30 years' service in the rubber industry, 27 of which have been with the du Pont organization. In his new position, he will have headquarters in Wilmington, Del., and will report to C. A. Bartle.

Alfred J. Northam

**L. E. Hardwick,** vice president and sales manager of The Bearfoot Sole Co., Inc., Wadsworth, O., has been elected to the board of directors of that organization. Mr. Hardwick, a graduate of Harvard Law School, has handled all legal matters for the company since coming into its employ in 1940. He became sales manager in 1945 and was elected vice president in 1949. He now joins the following company directors, who were reelected to their posts at the same time: I. B., Ernest, E. E., and T. D. Calvin, C. E. Chandler, and Robert Brouse.

**Richard O. Roblin,** internationally known scientist in the field of chemotherapy research, has been named assistant general manager of the research division of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Dr. Roblin, director of the chemotherapy division of the company since 1946, has been credited as a codiscoverer of sulfadiazine, a sulfa drug, and recently played a major role in the development of DIAMOX, a non-mercurial diuretic used in combatting endema. He is the author of numerous scientific papers, patents, and reviews and is currently associate editor of *Medicinal Chemistry Monographs.*

**Frank J. Vette** has been appointed assistant engineer of the adhesives and coating division of Minnesota Mining & Mfg. Co., St. Paul, Minn. Mr. Vette joined 3M in 1945 and has been a design engineer for the division since 1948.

**John A. Reid** has been promoted to Chicago district sales manager for Seiberling Rubber Co. to replace **Earl L. Luthy,** who retired after more than 31 years with the rubber firm. Mr. Reid began with Seiberling as a truck tire engineer in 1945, following which he was assistant manager of truck tire sales and, recently, assistant manager of the Chicago sales district. Mr. Luthy, a member of the company since 1922, had held the posts of district manager at Minneapolis and of district sales manager at Philadelphia before moving to Chicago in 1949.

**Herschel H. Cudd,** previously director of the engineering experiment station at Georgia Institute of Technology, has been named to the newly created post of manager of research and development of American Viscose Corp., Philadelphia, Pa. Dr. Cudd, author of a number of scientific articles and patents, has been associated with E. I. du Pont de Nemours & Co., Inc., International Minerals & Chemical Corp., and West Point Mfg. Co. In his new position he will be responsible for the research and development activities of the various departments and pilot plants and will have charge of coordinating and planning an expanded research program of the company.

**Charles F. Edelmann** has been appointed sales manager of the newly consolidated film and sheeting divisions at Firestone Plastics Co., Pottstown, Pa. Mr. Edelmann was formerly sales manager of the Velon film division and in his new position will supervise sheetings of all weights, including light-gage films and heavier-gage sheetings of the upholstery type. Salesmen under Mr. Edelmann's jurisdiction will represent the company for both types of Velon. Mr. Edelmann will continue his headquarters at the company's New York sales office, at 307 Fifth Ave.

L. Douglas Weiford

**L. Douglas Weiford** has been named assistant to the executive vice president in charge of government relations by the Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y. Mr. Weiford, who began with the company in 1929, was originally office and laboratory manager of the Stauffer plant at Roanoke, Va. A promotion to director of government relations for Stauffer occurred in 1941, when Mr. Weiford was transferred to the company's New York office to become the firm's Washington representative. Then, in 1950, Mr. Weiford moved to Washington to carry on government relations work and to establish a Stauffer office there. In Washington, Mr. Weiford also directs Stauffer government sales work. His Washington headquarters are at 1500 Massachusetts Ave., N. W.

**Matthew S. Fox,** Balfour MacLaine, Inc., has been elected a vice president of Commodity Exchange, Inc., New York, N. Y., to represent the rubber group. At the same time **David D. Haldane,** Littlejohn & Co., Inc., was elected, and **Frederick J. Jackson,** Hecht Levis & Kahn, Inc., was reelected to the board of governors to represent the rubber group.

**E. N. Cunningham,** of Precision Rubber Products Corp., Dayton, O., has been promoted from assistant sales manager to sales manager. Prior to joining Precision in 1951, Mr. Cunningham first had been with The B. F. Goodrich Co. and later with the rubber division of Enjay Co. as technical sales representative. In these positions he was closely associated with the early developments of nitrile and butyl synthetic rubbers. Mr. Cunningham had served on a number of technical committees for developing rubber specifications for the aircraft and automotive industries. He also is a member of the American Chemical Society, American Physical Society, Society of Automotive Engineers, and American Society for Testing Materials.

**A. F. Matheis,** assistant vice president of The Thermoid Co., Trenton, N. J. was elected president of the New Jersey Rubber Manufacturers' Association at its recent annual membership meeting. Mr. Matheis has been with Thermoid more than 35 years and has wide experience in the production and marketing of industrial rubber and insulated wire products.

**J. D. McPherson** has been made assistant manager of the manufacturers chemicals department, industrial chemicals division, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. In his new position Mr. McPherson will continue as technical director of the department. Mr. McPherson joined Cyanamid's engineering department in 1945 and later served as assistant to the director of purchases in the general purchasing department. In 1952 he was transferred to the industrial chemicals division as sales supervisor of organic acids and plasticizers.

**John B. Hermes,** controller of The Richardson Co., Melrose Park, Ill., has been elected to membership in the Controllers Institute of America, New York, N. Y.

**J. N. Vaughan,** of Firestone International Co., has been appointed Far Eastern manager of the company. Mr. Vaughan will have his headquarters in Manila and will supervise all activities in India, New Zealand, Singapore, and the Pacific area. **W. E. Kemerer** has been named to succeed Mr. Vaughan as manager of export trade in Akron, O. Mr. Kemerer, formerly assistant managing director of Firestone New Zealand, has been with the rubber company since 1929.

**Boyette Edwards, Jr.,** has been named supervisor of industrial engineering for the phenolic products plant of the General Electric chemical materials department, Pittsfield, Mass. Mr. Edwards previously had been employed by Armstrong Cork Co.; Booz, Allen & Hamilton; and Alexander Smith Carpet Co., as assistant director of engineering.

**Calvin M. Bolster,** recently retired rear admiral in charge of naval research, has been named coordinator of development of The General Tire & Rubber Co., Akron, O. Most of Bolster's 33 years of naval service has been connected in some way with aircraft, dirigibles, the Navy's jet-assist take-off research program, and rocket research. He is a graduate of the U. S. Naval Academy, of Massachusetts Institute of Technology, and of California Institute of Technology.

**A. M. Lowrey** has been appointed assistant general sales manager, western division branches, Quaker Rubber Corp., division of H. K. Porter Co., Inc., Philadelphia, Pa. Mr. Lowrey has been with Quaker Rubber for the past 13 years, rising from assistant manager-mechanical goods division to his present position. In this position he will coordinate the activities of the eight branches located in Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Minneapolis, Portland, and St. Louis.

**J. T. Black** has been promoted to the post of assistant manager of the sales and technical service division of Polymer Corp., Ltd., Sarnia, Ont., Canada. Mr. Black joined Polymer in 1946 after four years with Dominion Rubber Co., Ltd.

**George F. Plummer,** secretary-treasurer, Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., has been named chairman of the Canadian affairs committee of the Controllers Institute of America, 1 E. 42nd St., New York 17, N. Y.

# CANADA

## Rubber Industry Outlook Good

The outlook for the rubber industry in Canada in 1954 was called good by two industry leaders.

**J. D. Barrington,** president and managing director, Polymer Corp., Ltd., the Dominion's synthetic rubber producing facility, said that in 1953 business in Canada reached the highest level in the history of the country and that a good year in 1954 is expected.

Canada's prosperity depends on exports, and with the improvement in industrial output and standard of living in Western Europe the requirements from that area for basic materials continue to grow.

Inflation in Canada has already slackened and may well remain dormant during 1954. Business competition will be keen, but high activity should maintain employment and give strength to Canadian purchasing power.

Polymer Corp. has felt some slackening in domestic demand, but this has been more than offset by the vigor of its export business, Barrington said, and added that it is planned to operate the Sarnia, Ont., plant at full capacity, and he is quite confident that the entire output can be sold.

**C. C. Thackray,** president, Dominion Rubber Co., Ltd., stated that a continuing high level of business activity in Canada is the basis of his forecast for 1954. While the extensive industrial expansion may not reach the peak obtained in 1953, continued high production in the basic industries and a good level of consumer purchasing power should create a good demand in replacement business for most rubber products.

Some unemployment in the rubber industry has occurred due to the increasing rate of imports from those countries where exceptionally low wage rates prevail, it was added. Unit sales of passenger-car tires may be slightly lower, but sales of truck tires will probably increase. Sales of industrial products should remain at a high level.

The innate growth factors in the Canadian economy based on an increase in population, higher productivity, and utilization of natural resources will provide a strong stimulus in the expansion of the market for rubber products, it was concluded.

## Polyethylene Plant Expansion

Plans to expand the production capacity of its polyethylene plant by one-third have been announced by Canadian Industries, Ltd., Montreal, P.Q. Installation of additional equipment, expected to be completed by the end of this year, will cost an estimated $1,000,000.

Located at Edmonton, Alta., the facility employs the ethane from natural gas of local fields to produce polyethylene resin. The new capacity of the installation is expected to be 16,000,000 pounds a year, with further expansion contemplated if the demand arises.

The company has also made public the establishment of a new plastics department to assume the responsibility for polyethylene and other industrial plastics. Formed as a result of the size and continued rapid growth of the market for polyethylene resins, the extent and variety of technical development work to be undertaken, and the initiation of polyethylene manufacturing operations at the Edmonton works, the new department will be managed by H. G. Little, with J. H. Shipley serving as special assistant to the manager during preliminary operations.

J. D. Converse has been appointed to succeed Mr. Little as manager of the chemicals department of the company.

## PVC Plasticizer

*(Continued from page 633)*

within a compounded article, sustains an evaporation loss of only 4.7%, as compared to 22% for DOP plasticized material (SPI volatility test).

Recommended for use in sheeting, film, tile, wire insulating compounds, and plastisols, the new material requires (for processing rates comparable to DOP) slightly higher calendering, extruding, and dry blending temperatures because of its lower solvating action. This property is considered to be an advantage in that plastisols manufactured with DIDP exhibit a lower initial viscosity and a slower viscosity build-up rate. Also, although the original low-temperature flexibility of DIDP-plasticized sheeting is slightly inferior to that of DOP sheeting, the situation is reversed two days after the samples are subjected to the SPI extended volatility test. The prices of the plasticizers are comparable.

## Phenolic Price Reduction

BAKELITE CO., New York, N. Y., has announced the reduction in price of most standard phenolic molding materials by 1¢ a pound, of most unmodified phenolic resins by 2¢ a pound, and of phenolic resin solutions according to the solids content. In the case of the solutions, a 50% solids content material is reduced by ½¢ a pound; a 75% solids solution is lowered 1½¢ a pound, etc.

## Styrene in Housewares

HOUSEWARES and kitchen utensils accounted for nearly 20% of the estimated 252,000,000 pounds of styrene plastic produced in 1953, according to R. F. Hansen, marketing executive of Monsanto Chemical Co., Springfield, Mass. Speaking at the opening of the National Housewares & Home Appliance Exhibit at Navy Pier, Chicago, Ill., last month, Mr. Hansen also predicted no radical decline in the use of styrene even though a strong increase in the use of polyethylene was probable. It was possible, he added, that the amount of styrene used in housewares could even increase as a result of ingenuity on the part of the molders.

# FINANCIAL

**The Armstrong Rubber Co.,** West Haven, Conn., and wholly owned subsidiaries. Year ended September 30, 1953: net profit, $1,719,340, equal to $4.16 each on 400,478 common shares, compared with $1,651,802, or $4.05 each on 390,710 shares, in the previous 12 months; net sales, $62,290,322 (a record), against $55,436,947; federal taxes on income, $2,420,692, against $2,114,379; current assets, $23,130,522, current liabilities, $14,996,818, against $24,093,047 and $14,481,839, respectively, on September 30, 1952.

**The Dayton Rubber Co.,** Dayton, O. Year ended October 31, 1953: net profit, $1,602,203, equal to $2.57 each on 587,652 common shares, compared with $1,500,875, or $2.47 each on 571,167 shares, in the preceding fiscal year; net sales, $57,922,461 (a new high), against $54,023,245.

**Dow Chemical Co.,** Midland, Mich., and subsidiaries. Six months ended November 30, 1953: net profit, $16,763,554, equal to 71¢ each on 22,651,011 common shares, compared with $17,224,023, or 77¢ each on 21,433,016 shares, a year earlier; net sales, $212,693,400, against $204,944,652.

**Firestone Tire & Rubber Co.,** Akron, O., and subsidiaries. Year ended October 31, 1953: net income, $46,748,971, equal to $11.77 each on 3,938,062 common shares, compared with $43,081,717, or $10.89 each on 3,912,993 shares, in the preceding fiscal year; net sales, $1,029,402,035 (a new high), against $965,364,427; income and excess profits taxes, $47,400,000, against $40,900,000; current assets, $391,970,582, current liabilities, $98,633,085, against $383,740,336 and $95,508,906, respectively, on October 31, 1952.

## Dividends Declared

| Company | Stock | Rate | Payable | Stock of Record |
|---|---|---|---|---|
| Armstrong Cork Co. | Com. | 0.75 | Mar. 3 | Feb. 16 |
| | $3.75 Pfd. | 0.93¾ q. | Mar. 15 | Mar. 1 |
| | $4.00 Pfd. | 1.00 q. | Mar. 15 | Mar. 1 |
| Armstrong Rubber Co. | Cl. A | 0.50 q. | Apr. 1 | Mar. 17 |
| | Cl. B | 0.50 q. | Apr. 1 | Mar. 17 |
| | 4¾% Pfd. | 0.59⅜ q. | Apr. 1 | Mar. 17 |
| Baldwin Rubber Co. | Com. | 0.10 extra | Jan. 25 | Jan. 15 |
| Boston Woven Hose & Rubber Co. | Com. | 0.20 | Feb. 25 | Feb. 15 |
| Crown Cork & Seal Co., Inc. | $2.00 Pfd. | 0.50 q. | Mar. 15 | Feb. 15 |
| Firestone Tire & Rubber Co. | 4½% Pfd. | 1.12½ q. | Mar. 1 | Feb. 16 |
| General Tire & Rubber Co. | Com. | 0.50 q. | Feb. 26 | Feb. 15 |
| Goodall-Sanford, Inc. | 4% Pfd. | 1.00 q. | Mar. 1 | Feb. 15 |
| | 6% Pfd. | 0.75 q. | Mar. 1 | Feb. 15 |
| Goodyear Tire & Rubber Co. | Com. | 0.75 q. | Mar. 15 | Feb. 16 |
| | $5.00 Pfd. | 1.25 q. | Mar. 15 | Feb. 15 |
| Byron Jackson Co. | Com. | 0.37½ | Feb. 15 | Jan. 29 |
| Johnson & Johnson | 4% Pfd. C | 1.00 q. | Feb. 1 | Feb. 1 |

# NEWS FROM ABROAD

## MALAYA

### Finance Ministers to Discuss Stockpiling

Britain is ready to consider any move calculated to stabilize rubber prices, and one of the subjects up for discussion at the Commonwealth Finance Ministers Conference in Sydney, Australia, is a plan for stockpiling rubber by the United Kingdom, Britain's Chancellor of the Exchequer, R. A. Butler, stated in Singapore early in January.

The possibility of Britain's actually embarking upon such a scheme would naturally depend on whether producers favored it, on the talks in Sydney, and primarily on United States cooperation. For stability hinged on American demand, the nature of American purchases, the relation between state and private purchases, and plans for further stocks.

Mr. Butler's statements were on the whole doubtfully received in Malaya. H. A. Campbell, chairman of the Rubber Producers' Council, pointed out that commercial stockpiling always involved surplus rubber and could have reverse repercussions later on. He added that if by some "formula of commercial stockpiling" the situation could be improved without affecting any forward position, it would be a good thing.

The prevailing opinion in rubber circles seemed to be that stockpiling by Britain alone could not be of much use unless supported by America, and many felt that instead of aiding such a scheme, America, by manipulation, could create serious problems for it. The conclusion thus was that the only solution would be to put stockpiling on an international basis. In other words, the idea of an international buffer stock, unsuccessfully discussed by the Rubber Study Group last October, is not dead, and there are those who feel it ought to and will be resurrected.

*The Malay Mail*, discussing the matter editorially, pointed out other problems, unrelated to possible American maneuvers. First, was the cost of stockpiling on an effective scale, which would be practically impossible for Britain to carry alone; to make any difference in world surplus, the paper calculates, annual stockpiling would have to amount to upward of 200,000 tons. The scheme might be feasible, however, if the Conference at Sydney accepted responsibility for introducing measures to encourage the manufacturers of the different Commonwealth countries to safeguard their own interests by increasing their stocks. But, warns the paper, stockpiling as a means of stabilizing prices can work against producers' interests. There is always the threat of liquidation of stocks, resulting in a depressed market, and manufacturers might be tempted to rotate their stocks to benefit themselves "just as United States stockpiling authorities have been doing."

### Malayan-Indonesian Rubber Talks Suggested

Prompted by the widely diverging opinions held by the two groups on important matters affecting the future of rubber, leaders of the rubber industry in Malaya are urging joint seminars between rubber men in Indonesia and Malaya, at which these differences could be discussed. It is realized that as long as the producers of the two most important rubber countries cannot agree among themselves, they cannot present a collective view that will carry weight in international rubber conferences.

Recent reports of discussions in Indonesia of the comparative position of the rubber industry there and in Malaya are said to have revealed little factual knowledge of Malaya's needs, difficulties, and future prospects, on the one hand, and strong disagreement with several Malayan rubber policies on the other. Thus, unlike Malayan producers, who favor replanting with high-yielding trees because they consider it better to produce rubber as efficiently and cheaply as possible, Indonesian producers hold to the view that since there is already a threatened surplus of natural rubber, there is little sense in an undertaking to increase productive potential. Nor do they share the Malayan view that the consumption of all rubber—including natural—is due to increase in the years to come.

Such differences of opinion the seminars are expected to help iron out, and it is suggested to hold them twice a year, once in Singapore and once in Djakarta, Java, when representatives of dealers and shippers as well as of estate owners and smallholders would attend.

It is understood that the proposal is being considered by government officials in Malaya.

### Sir Sydney Palmer Urges More Rubber Roads

Sir Sydney Palmer, past president of the Rubber Development Board and a director of rubber planting companies, recently revisited Malaya after an absence of four years and then sharply criticized the attitude of the Public Works Department of Malaya with regard to rubber roads. A tour, which included every state in the Federation, left him with the impression that this department was against rubber roads and had very little information to support their view.

"We, as the second largest producer of natural rubber in the world, should, I think, have been the first to carry out experiments after the war; whereas only about one and a half miles of rubber roads have been laid in the Federation since the liberation," he is quoted as having said.

The Department appeared to know so little about rubber roads that he recommended a visit by an experienced engineer to America to study results there.

In discussing American synthetic rubber, Sir Sydney stated that if synthetic rubber manufacture were transferred to private enterprise, the price of synthetic rubber would almost certainly rise for the first two or three years. But America employs probably the finest scientists in the world on synthetic rubber, and they are improving the product every year—a fact to be borne in mind.

Replying to Sir Sydney's remarks on rubber roads, K. Nankivell, Public Works Director, said that his department is experimenting widely with both rubber latex and powder in road surfaces, and that special laboratory equipment had been ordered for research. He added that experimental stretches have been or are being laid in every State and Settlement except in Trengganu, but that:

"Up till now there has been no conclusive evidence that rubber bitumen is superior to asphalt in tropical conditions."

There is no evidence to justify expenditure of large sums of money in Malaya on the use of rubber bitumen, he concluded, and stressed that some time must elapse before rubber can be generally used on roads.

Incidentally, Sir Sydney, who also spent ten days in Sumatra inspecting companies with which he is connected, reportedly found that thousands of acres of rubber in the "backblocks," planted in 1926, at the time of the Stevenson restriction scheme, have never been tapped. Labor could not be induced to go so far out even when rubber was selling at 5s to 6s per pound (70¢-85¢ U. S.). Planting companies in Sumatra were hampered by every kind of difficulty; rubber stealing was rife, and there was an almost incredible amount of illicit tapping. Under present conditions in Indonesia there was not the slightest hope that foreign companies would invest in agricultural and other industries, he added.

### Rubber Industry Notes

The low price of rubber, which has averaged under 60 cents (Straits) for some months, has again precipitated a wage dispute. This time the rubber workers' union, feeling that wages should be based on human needs and not on the fluctuating price of rubber, applied to the Chief Secretary for a wages council to settle the matter and to decide on a minimum wage for tappers. Since consideration of the application would require time, arbitration to determine wages from January 1 was agreed on by employers and the union. The former had already offered "wages within the competence of the industry to pay," but the union insisted there should be no wage cut pending the decision of its application for a wages council.

During 1953, approved applications for replanting by smallholders covered about 47,000 acres, 8,000 acres less than the target set for the year. Applications up to 60,000 acres are expected during 1954, and, subject to the approval of the Rubber Industry (Replanting) Board, grants totaling $10,000,000 (Straits) may be made to enable smallholders to replant with high-yielding rubber trees. The Board is also encouraging the replanting with other crops as rice, coffee, fruit trees, and coconuts, and those undertaking approved replantings will receive the same initial grant of $120 (Straits) as smallholders replanting rubber.

Preliminary figures for 1953 give the total exports of rubber from Malaya as 846,316 tons, against 910,408 tons in 1952. Imports in the same periods came to 277,530 and 338,856 tons respectively. It would thus appear that almost the entire decrease in 1953 exports from Malaya was due to the substantial decline of imports into Malaya.

# FRANCE

## Report of 1952 French Productivity Mission

At the invitation and under the auspices of the Mutual Security Agency, and in liaison with various French Government departments and productivity groups, a French mission arrived in New York on January 10, 1952, to spend six weeks in studying production methods in the American rubber industry. Figures had indicated that output per man in various branches of industry was from two to 3.5 times higher in the United States than in France, and the aim of the mission was to discover the causes of this disparity. The mission of 14 men, recruited from eight different rubber companies and including chief executives and engineers, foremen, factory workers, and union representatives, visited 17 rubber goods and six rubber machinery factories and attended a number of official gatherings and meetings arranged by rubber men, associations, and unions.

The information obtained and the impressions formed by the mission have been assembled in a 186-page, well-illustrated report, which has just come to hand. The report is divided into four parts, and it is worth noting that of these four parts the first two, comprising not much less than half the total number of pages, are devoted to general conditions in the United States and the steps taken to prepare for production. Not until the geography, historical background of the people, natural resources, industry in general, groups, market, social structure, labor laws, organization of companies (covered in Part I) and market studies, merchandising, distribution, selling, financing, scientific and technical research, planning, procurement, plant layout, upkeep, personnel training, wages, safety measures, cooperation of suppliers (Part II) have been treated, does the report begin in Part III to discuss the actual manufacturing processes and to set forth the technical information the mission gained on the production of automobile tires and tubes, cycle tires, footwear, heels and soles, hose and belting, mechanical goods, sponge and foam rubber, latex goods, and reclaim. Part IV, covering only a few pages, deals with production, quality, and cost control.

The output of 46 American companies making pneumatic tires and tubes is compared with that of eight French firms. In 1951 the former included 65,634,000 passenger tires and 17,816,000 heavy-duty tires (78.7% and 21.3% of the total, respectively), in addition to 67,476,000 tubes for both types. French output in this time was estimated at 4,496,000 passenger and 153,000 truck and bus tires (65% and 35% of the total, respectively).

The American tire industry employed 120,000 persons, of whom 94,700 were factory workers, against 22,800 (including 15,800 factory workers) in France. It will be noted that the proportion of factory workers to total personnel is lower in France than in the United States. Output per man in 1951 worked out at 547 passenger tires and 148 heavy-duty tires in America against 201 and 94, respectively, in France. Factories in the United States sell 3.9 times more passenger tires and 2.2 times more heavy-duty tires than their French opposites.

As is evident, the mission made as thorough a study of the industry and the human and other factors involved as time limits permitted. What seems to have made the greatest impression is the relation of labor and management in America, and the prevailing team spirit, which the French visitors see as fundamental to higher productivity in the United States. The recognition by companies that labor is a good customer and by labor that its welfare depends on the prosperity of the companies seemed to be general, the mission found, and this led to a state of mind conducive to greater consideration for labor, on the one hand, and to greater effort at cooperation by labor on the other.

Another point the report stresses is the meticulous pains with which every step from initial planning to finished product is worked out before production actually begins—the careful layout, training of personnel especially for the higher echelons, the cooperation between suppliers and factory, the pioneering spirit of heads of companies, and their continued willingness to learn.

In seeking to explain high productivity in the United States, the mission insists, Europeans must rid themselves of prevailing misconceptions about colossal factories, excessive standardization, extraordinary heavy equipment, informal working pace for labor. On the contrary, the mission found a tendency in the rubber industry for big companies to decentralize; many medium size factories are equipped with materiel known also in France; there is considerable diversity in the products made; the working man is not unduly fatigued—he has machines to help him and he works at an even, rather easy pace without apparent effort. The whole secret of high productivity, it concludes, is carefullest planning plus a special state of mind.

The mission was convinced, from what it saw in the American rubber industry, that productivity in France would be greatly increased even with existing equipment and without making any greater demands on labor, if everyone—owners, executives, and workers—joined in the necessary arrangements and organization required to create the indispensable state of mind, in particular by assuring to consumers, personnel, and companies, an equitable share in the fruits of increased productivity.

## Xetal—Positive Latex

The Positex method developed in England for improving woolen materials by deposition of latex in which the electrical charge on the rubber particles has been reversed, has become well known. Now it is learned that in France the Institut Français du Caoutchouc undertook similar investigations, the result of which is a positive latex covered by French patent No. 844,021, license to produce which has been acquired by the S. A. Franterre.

The French positive latex, known as Xetal, is supplied in two qualities, Xetal 50 and Xetal W, which differ chiefly as to the proportion and type of tension-active agents utilized. Xetal W has certain advantages over Xetal 50—it can be used cold; it contains antioxidants, thereby avoiding the sticky feeling that fabrics treated with positive latex have as a result of the oxidation decomposition of the rubber.

Xetal is a milky liquid, containing 50% dry rubber; it can be considerably diluted with pure water, and its pH modified within large limits; fillers, colors, waxes, etc., may be added. The product has excellent stability and is practically noncoagulable; nevertheless, it is very sensitive to heavy metals, particularly copper. Application of this latex requires no special equipment; the apparatus employed for treating fabrics with the usual dressings suffices.

Treatment with Xetal is said to increase the tensile strength of wool yarns and fabrics, but the extent of the imrovement depends on the quality of the wool; thus a carpet yarn becomes 14.2% better, but a combed yarn, only 1.3%. Abrasion resistance is also raised, and comparative tests with substances usually employed for the purpose proved Xetal W, when used in suitable proportions, to be one of the most effective. Other tests indicated that Xetal is best applied after dyeing. When properly treated with Xetal, fabrics retain their porosity. On the other hand Xetal is less effective in preventing felting than are the classical dressings.

It is pointed out that the feel of wool containing positive latex differs from untreated wool, and that this difference is acceptable and even sought by some, but that others do not approve it.

## Rapid Vulcanization of Ebonite

On the basis of experiences at the Institut Français du Caoutchouc, F. Lepetit developed the following formula[1] permitting rapid vulcanization of ebonite in an ordinary oven at 150° C., without pressure or elevation of temperature.

| | |
|---|---|
| Dry rubber (in the form of 60% latex) | 100 |
| Sulfur | 35 |
| Zinc oxide | 3 |
| Diethyldithiocarbamate of zinc | 2 |
| Mercaptobenzothiazolate of zinc | 1 |

Depending on the uses of the article to be manufactured, the sulfur content may vary from 30 to 40%. Wherever possible, the latex should be loaded with chalk to facilitate drying, reduce thermoplasticity as well as the risk of pitting and deformation during vulcanization, produce a clearer color, and reduce costs. The amount of chalk used depends on the process employed, whether molding with thermosensitive latex or flow-casting; up to 150% in the one case and 300% in the other is added.

Curing time at 150° depends on the thickness of the object and ranges from 1½-2 hours for thickness of three millimeters, and up to 4-6 hours for a thickness of 30 millimeters. The articles are finished by trimming, pickling in a hydrochloric acid solution, and polishing or varnishing. With the formula given, whitish or colored ebonite is obtainable provided the amount of sulfur is limited to 30%, or curing is continued for a longer time at a lower temperature; at least 200% chalk is incorporated, and the article is pickled. In the case of colored ebonite, careful selection of pigments is also necessary.

The formula is suitable for the processes most generally in use for ordinary latex articles. Flow-casting can be employed to produce hollow forms to be used in the manufacture of dipped goods, as well as cups, beakers, bottles for corrosive liquids, toys, and decorative objects. Mechanical goods, molds for the production of molded latex goods, and decorative panels can be made by molding thermosensitive latex; thin-walled articles can be made by dipping, and chemically resistant linings and surfaces, by coating.

[1] *Rev. gén. caoutchouc*, 30, 4, 256 (1953).

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## French Rubber Industry Notes

The two hundred and fiftieth anniversary of François Fresneau, the "Father of Rubber," as he is often called, was observed October 11, 1953, in his birthplace, Marennes, when, in the presence of his last direct descendants, the Count and Countess François de Chasseloup-Laubat, a commemorative plaque was placed over the font where Fresneau himself was baptized September 30, 1703. He was born on September 29, 1703.

On October 2, 1953, the centenary was celebrated of the well-known French rubber company, Etablissements Hutchinson. In 1853, Hiram Hutchinson, a friend of Charles Goodyear, left his native Massachusetts for France and set up a rubber footwear factory at Langlee. His son expanded this undertaking, establishing a sales branch in London, England, and a branch factory in Mannheim, Germany. Hiram's grandsons did not do so well, and in 1898 the concern was taken over by a small group of Frenchmen, who operated it under the style, Société Anonyme des Etablissements Hutchinson. Among the founders of this later development were Ernest Ducas, Georges Lelièvre, and Jacques Sée, whose descendants today occupy leading positions in the firm; the present Georges Lelièvre is its president.

In the 100 years of its existence the firm has greatly extended its field to include, besides a wide variety of footwear, weatherproof garments, cycle and motorcycle tires, all kinds of hose, belting, mechanical goods, hard rubber goods, sponge rubber goods, etc., and it uses close to 9,000 tons of rubber annually. The factory at Langlee now employs about 6,000 persons, and there are also factories in Persan and Puteaux in France, besides a factory each in Mannheim, Germany, Milan, Italy, and Madrid, Spain.

A proposal has reportedly gone out from the French Alcohol Producers' Association to the Chemische Werke Huls, A.G., in West Germany, whereby 500,000 hectoliters of alcohol would be supplied to the German concern for the production of synthetic rubbers. It seems that a long-term contract is envisaged with the alcohol delivered at 24 francs per liter, and France receiving, annually, in exchange 12,000 tons of synthetic rubbers at 210 francs per kilo.

French tire manufacturers early in September, 1953, announced a reduction in the prices of tires averaging 6%.

Societe F. L. Graham, Paris, has changed its name to Cabot Products Europa. The company, sole distributor in France of the carbon blacks produced by Godfrey L. Cabot, Inc., is now also to take charge of sales to other European countries.

Societe Rhodiaceta, Lyons, manufacturer of acetate and nylon, will produce the polyester fiber, Terylene, under license from Imperial Chemical Industries, Ltd., of England.

# GREAT BRITAIN

## Rubber Industry Shows Drop for '52

The British rubber industry in 1952 suffered a more pronounced setback from the high levels of 1951 than did British industry as a whole, John Lord pointed out in his review of the activities of the Federation of British Rubber Manufacturers' Associations, for 1952-53. Mr. Lord, who retired from the presidency of the Federation in June, 1953, considering the decline in terms of rubber consumption, said the total amount of new rubber used had decreased 15%; the amount used for products other than tires was 8% less. At the same time the number of persons employed at the end of 1952, at 103,400, was about 8,600 lower than in 1951.

Exports of rubber goods also dropped, he said. The total value of rubber exports, other than tires, was £15,000,000 in 1952, against £20,000,000 in 1951. The 1952 total, however, had still been £2,000,000 above that for 1950. Moreover the decline in volume was much smaller than in value, since prices had been generally reduced. Export restrictions in Australia and New Zealand—since relaxed as far as the United Kingdom is concerned—were partly responsible for the lower export figures.

Mr. Lord also took up the matter of synthetic rubbers, stating that their greater availability in the United Kingdom would not only be welcome, but had become a competitive necessity. He stressed that England was far behind the United States, Canada, and Germany in synthetic rubber manufacture, and that rubber was no more indigenous to England than to the countries named and, therefore, was vulnerable as to supply. Apart from the question of supply, he added, synthetic rubber was a stabilizing factor. Since 1950 the price of synthetic has been relatively stable; whereas natural rubber has fluctuated wildly. Consequently Amer-



ican manufacturers, who have to use more than 50% of synthetic rubber in their products did not—unlike their British opposites—feel the full impact of these price variations.

As to the outlook, Mr. Lord felt that while full recovery could not be predicted, prospects were brighter for the British rubber industry, though conditions would not be easy.

## Charlesby Findings

In the House of Commons on November 9, the discovery made by A. Charlesby, at Harwell, that certain plastics can be improved by high energy irradiation in a nuclear reactor was the subject of certain questions put by a member of Parliament, who wished to know whether the Ministry of Supply could assure the House that the discovery had been protected by suitable patent application. He pointed out that the interest aroused in America by the discovery had been so great that within 15 days of the publication of the paper on the subject, Dr. Charlesby had received the first inquiry, and that General Electric Co. of America is already in limited production. He asked whether the Minister of Supply could tell the House what license fees are being paid by American exploiters of this discovery, and secondly what steps he is taking to encourage British industry also to use this British invention.

The Minister of Supply could not answer the question as to fees, but could state that the Charlesby findings are being made freely available to British industry.

It may be recalled that Dr. Charlesby, of the Atomic Energy Research Establishment, Harwell, had discovered that high energy irradiation from an atomic pile caused cross-linking in certain long-chain products, like polythene, Terylene, nylon, and unvulcanized rubber; the degree of cross-linking depends on the dosage of radiation over a very wide range. At first polythene was the only substance investigated, and it was found that above a certain short irradiation dosage, it becomes insoluble in organic compounds and does not melt even at temperatures above 120° C. Further increased irradiation caused it to acquire a rubber-like elasticity, and under very large dosages of irradiation it becomes amorphous, completely glass-like, and hard.

More recently it was reportedly shown that unvulcanized rubber becomes vulcanized when exposed to radiation of an intensity of about one million curies.[1] It seems that the rubber, which is exposed for about 20 minutes, does not become radio-active and can be handled like ordinary vulcanized rubber as soon as it leaves the pile.

[1] Curie equals $3.7 \times 10^{10}$ disintegrations per second.

## New Products

Michelin Tire Co., Ltd., Stoke-on-Trent, has begun production in England of the Michelin X tire, in which the tread is bonded to three layers of steel cords. A further feature of this tire, which is claimed to have about twice the life of a normal tire besides giving greater riding comfort and increased road grip, is that the textile cords of the walls are arranged straight across from bead to bead instead of criss-crossing diagonally.

Moltoprene, the polyester-diisocyanate foam material put out by the Bayer concern of Leverkusen, Germany, is now being produced in England by Kay Brothers, Ltd., Stockport. This light foamed rubber—its density ranges from 0.04-0.07—is said to be moth-, rat-, and bacteria-proof, odorless, unaffected by air, ozone, sunlight, oil, gasoline, grease, and water. It is supplied in varying qualities and degrees of hardness in sheets up to 6.5 by 3.3 feet, in any color desired.

Binney & Smith & Ashby, Ltd., London, is marketing a compression/deflection and compression/set machine for testing rubber sponge and expanded rubber, according to U. K. specifications for sponge rubber. The machine is said to be the only one of its kind on the market, outside of that developed jointly by the Latex Foam Manufacturers' Association and Dunlop Rubber Co., Ltd.

## Official Opening of Rubber College

Although it had been inaugurated more than a year ago and courses were started in September, 1952, the National College of Rubber Technology was not officially opened until November 3, 1953, when Lord Baillieu, chairman of Dunlop Rubber Co., Ltd., performed the opening ceremony in the presence of a large gathering including high government officials and leaders of the rubber industry. The College adjoins Northern Polytechnic in


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Adamson United Company, Akron, Ohio
Lobdell United Company, Wilmington, Delaware
Stedman Foundry and Machine Company, Inc., Aurora, Indiana
Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

North London, where a rubber school has been conducted for 30 years. Polytechnic has provided the new institution with much equipment and part of its staff. The cost to the Ministry of Education for buildings and necessary equipment is said to have been close to £200,000.

### Census of Production, 1950

According to details published in Volume II of the "Report of the Census of Production, 1950," which recently appeared, in the United Kingdom in that year 325 rubber manufacturing establishments employed on average more than 10 persons and a total of 91,767, including working proprietors. Their gross output was valued at £162,069,000; net output, £57,881,000. In addition, 192 small firms (with on average under 10 workers) employed 1,033 persons.

By comparison, in 1953 there were 185 establishments with more than 10 workers, whose gross output was valued at £27,539,000, net output at £14,028,000, who employed altogether 54,098 workers.

### IRI Notes

At a meeting of the council of the Institution of the Rubber Industry, October 20, 1953, Lord Baillieu and S. D. Sutton were reelected president and honorary treasurer, respectively, for 1954.

The Colwyn Medal for 1953 was awarded to D. Parkman, manager of the compounding research department of Dunlop Rubber Co., Ltd., Birmingham; while the Hancock Medal went to Herbert Rogers.

The annual general meeting and dinner were held December 10.

## NETHERLANDS

### New Latex Dipping Process

After reviewing the difficulties encountered in the usual methods of making articles by straight dipping in normal and heat-sensitized latices, P. Braber and G. W. van Raamsdonk show[1] how they succeeded in solving some of the problems by utilizing the observations of G. M. Kraay and M. v. d. Tempel, of Rubber Stichting. These two workers had found that the gelling at elevated temperatures of a latex containing ZnO and $NH_4Cl$ (Kaysam mixture) depends on the reaction of free Zn-ions with the fatty acids absorbed at the surface of the rubber globules.

Kraay and v. d. Tempel also pointed out that the velocity of gelling of a Kaysam-type latex in heat depends on the ammonia content—that is, the rate of gelling decreases with increasing concentration of ammonia.

The ammonia content of a Kaysam compound is considerably increased to confer great stability; formers dipped into the ammonia-rich mixture are rotated in the air, whereby ammonia is rapidly evaporated, resulting in the formation of active Zn-ions. The stabilization of Kaysam by increasing the ammonia content is said to be so effective that viscosity remains unchanged for more than 26 days. The excess ammonia in no way hinders the dipping process, since it evaporates rapidly, it is stressed.

It is suggested that the new method would be especially useful for producing thick articles by straight dipping with heated formers; and for thin-walled articles, by straight dipping with cold, non-porous formers. It is added that no other equipment is required but what is usually employed in ordinary dipping processes.

[1] Communication No. 233a, Rubber Stichting, Delft.

### Van Rossem Retires

Public officials as well as personalities prominent in the rubber world met in Delft on November 3 to honor A. van Rossem on the occasion of his retirement as director of the Rubber Institute of the Dutch Organization for Industrial Research (TNO), Delft.

After the opening address by D. Dresden, chairman of the Organization for Industrial Research, who praised the merits of the retiring professor with much wit, the announcement was made

by the Burgomaster of Delft, J. de Loor, that Queen Juliana had been pleased to create Professor van Rossem, Knight in the Order of the Dutch Lion.

Next the Association of Dutch Rubber Manufacturers, the Rubber Stichting, and the Indonesian Rubber Research Institute (INIRO), together with other important institutions and private persons, offered van Rossem an unusual remembrance—a voyage to Indonesia to enable him to get first-hand information on the problems connected with the production of *Hevea* rubber.

Prof. G. van Iterson, under whom van Rossem had studied, described his former pupil's career and scientific work and also spoke on behalf of Jhr. Dr. de Jonge, chairman of the board of Rubber Stichting, where van Rossem had directed the rubber research department during 1935-1949.

Others who spoke of his achievements and paid tribute to the man, the scientist, the colleague, and the instructor, were Dr. v. d. Meyden, a former pupil and now director of the R.C.M.A. plantation company, who spoke for the Rubber Growers' Association; E. Schiff, of the Association of Dutch Rubber Manufacturers; R. Houwink, director-general of Rubber Stichting; Dr. Geldof, deputy director of the Rubber Institute TNO, and Dr. v. Wijk, a former coworker.

Foreign rubber research institutes also took pleasure in honoring Professor van Rossem. M. P. Petithuguenin and J. le Bras, of the Institut Français du Caoutchouc, and Prof. A. R. Mathis, of the Technical Institute of Charleroi, Belgium, attended the meeting in person; while the director of the Association of British Rubber Manufacturers, Croydon, the chairman of the International Rubber Research Board, and S. S. Pickles expressed themselves in letters.

## SOUTH AFRICA

The General Tire & Rubber Co. (S.A.), Ltd., reports a reduction in profits from £84,725 in 1951 to £66,043 in 1952; the ordinary dividend was cut from 4½d to 3d per share.

The Goodyear Tire & Rubber Co. (S.A.), Ltd., booked net profits of £276,360 in 1952 after providing for depreciation and taxation. A dividend of 2s. was paid on the ordinary shares, and £840,021 was carried forward. An amount of £499,417 was spent on expansion of the Uitenhage plant, and a further £150,000 is earmarked for the same purpose in 1953. The expansion is expected to increase the company's facilities for producing material for use in the recovery of uranium.

The Firestone Tire & Rubber Co. factory at Port Elizabeth is producing the biggest tires in Africa, giant tires for earth-moving tractors. These tires weigh 850 pounds each, are almost six feet high, and have a cross-section of nearly two feet.

Higher taxes were among the chief causes of the reduction in the net profit booked by Dunlop South Africa, Ltd., in 1952, when the figure was £264,417, against £275,008 in 1951. Dividend on ordinary shares was again 12%; £100,000 was put to reserve. The company has completed a cycle rim plant at Benoni and has expanded the rubber tank-lining plant.

The University of the Witwatersrand, Johannesburg, has reportedly received from an old-age pensioner the gift of a formula for a rubber preservative as developed by himself. No details have been revealed regarding the formula beyond the facts that the liquid it yields impregnates as well as coats the rubber to which it is applied, and that preliminary tests indicate it has possibilities.

V-belt transmission drives, according to the British specifications of J. H. Fenner & Co., Ltd., are being produced by Reunert & Lenz, Ltd., Wadeville, Transvaal. The Fenner plastic-covered conveyor belting produced for collieries in the United Kingdom are now also being considered for use in local coal mines.

## BRAZIL

Output of rubber in Brazil has fallen below 1952 production since May, 1953, month by month figures for the periods January-August, 1953 and 1952, reveal, so that contrary to earlier expectation, total production for the year 1953, instead of reaching the estimated 28,300 to 31,500 dry tons, is likely to be less than the 1952 total of 26,245 tons. Indeed, well-informed sources are said to count on no more than between 23,600 and 26,000 long tons, dry, for the whole of 1953. The figure for the first eight months of 1953 was 17,608 tons, against 17,841 tons in the same period of 1952.

(*Continued on page 670*)

# New Materials

## EPOX-S—Triester Plasticizer

PERMANENCE, heat and light stability, and ease of processing are advantages claimed to be obtainable through use of EPOX-S, an epoxidized triester plasticizer of higher than usual molecular weight. Available from the Rubber Corp. of America, 274 Ten Eyck St., Brooklyn 6, N. Y., the new material is recommended for use in extrusions, floor tile, molded articles, and film and sheeting of both natural and synthetic rubber.

EPOX-S is reported to possess the desirable properties of both the more familiar monomeric esters and the true polymeric types. Its epoxy-oxygen content adds stabilizing action when used with vinyl resins; while compatibility is assured with most materials owing to the low degree of unsaturation of the plasticizer. Low viscosity for easy handling, and high molecular weight for a reduction in migration are additional properties claimed for the material.

## Strip-Grip Rubber Roll Compound

THE development of a new, non-glazing rubber roll compound whose use on contact rolls in continuous steel strip processing is reported to eliminate slippage and surface "fogging" of high-finish steel strip has been announced by The B. F. Goodrich Co., Akron, O. Called Strip-Grip, the new compound presents a smooth, regular ground surface, of which the non-glazing feature is an integral part.

Recommended for contact rolls used in tin electroplating, annealing, and galvanizing, Strip-Grip rolls do not require the frequent roughing or dressing of conventional roll covers, according to the manufacturer. In addition, roll covers made from the new compound do not become cracked and corrugated since high operating pressures are not required for operation. Finally, the percentage of strip that can be sold as first quality greatly increases when the non-fogging Strip-Grip rolls are employed. The new material is available in black or tan in a wide range of durometer readings.

## Finish for Acrylics—Logoquant SF 252

A NEW improved finish for acrylic plastic, available in pigmented colors and metallics and in unpigmented gold and aluminum metallics, has been developed by Logo, Inc., Chicago, Ill. Called Logoquant SF 252, this new material can be applied to the plastic surface by using a special thinner, which is known as SF 253.

A colorless film when dry, SF 252 claims the properties of absolute grease resistance (100 hours in a 50-50 lard-oleic acid mixture), humidity resistance (1,000 hours at 110° F. at 100% relative humidity), temperature resistance (25 cycles of 0-80° F., and 168 hours aging at 158° F.), stain resistance (48 hours in fruit juices, etc.), and soap and detergent resistance (24 hours in 2-3% solution at 110° F.). In addition, standard pigments used in SF 252 are reportedly non-bleeding and stable to light. The product dries to touch in five minutes after application and is capable of being packed after 1-3 hours.

## Auxiliary PVC Plasticizer—Pycal 170

PYCAL 170, an aromatic based, auxiliary low-temperature plasticizer for polyvinyl chloride, has been developed by Atlas Powder Co., Wilmington, Del. Recommended for use in combination with dioctyl phthalate (DOP), the new material is said to provide ease of calendering and extrusion because of its internal lubricity and, in plastisols and organisols, lower initial viscosity and slower viscosity build-up because of its lower solvency for PVC resins.

In combination with DOP, Pycal 170 reportedly results in compounded products with better low-temperature properties than DOP alone, low volatile loss, lower soap extraction losses, less tendency to mar varnish and lacquer surfaces, and lower cost than other such auxiliary plasticizers. It is further claimed that formulations which use this plasticizer combination (approximately 10-30% Pycal 170) have physical properties equivalent to those containing only DOP.

Suggested for use in opaque compounds for garden hose, sup-

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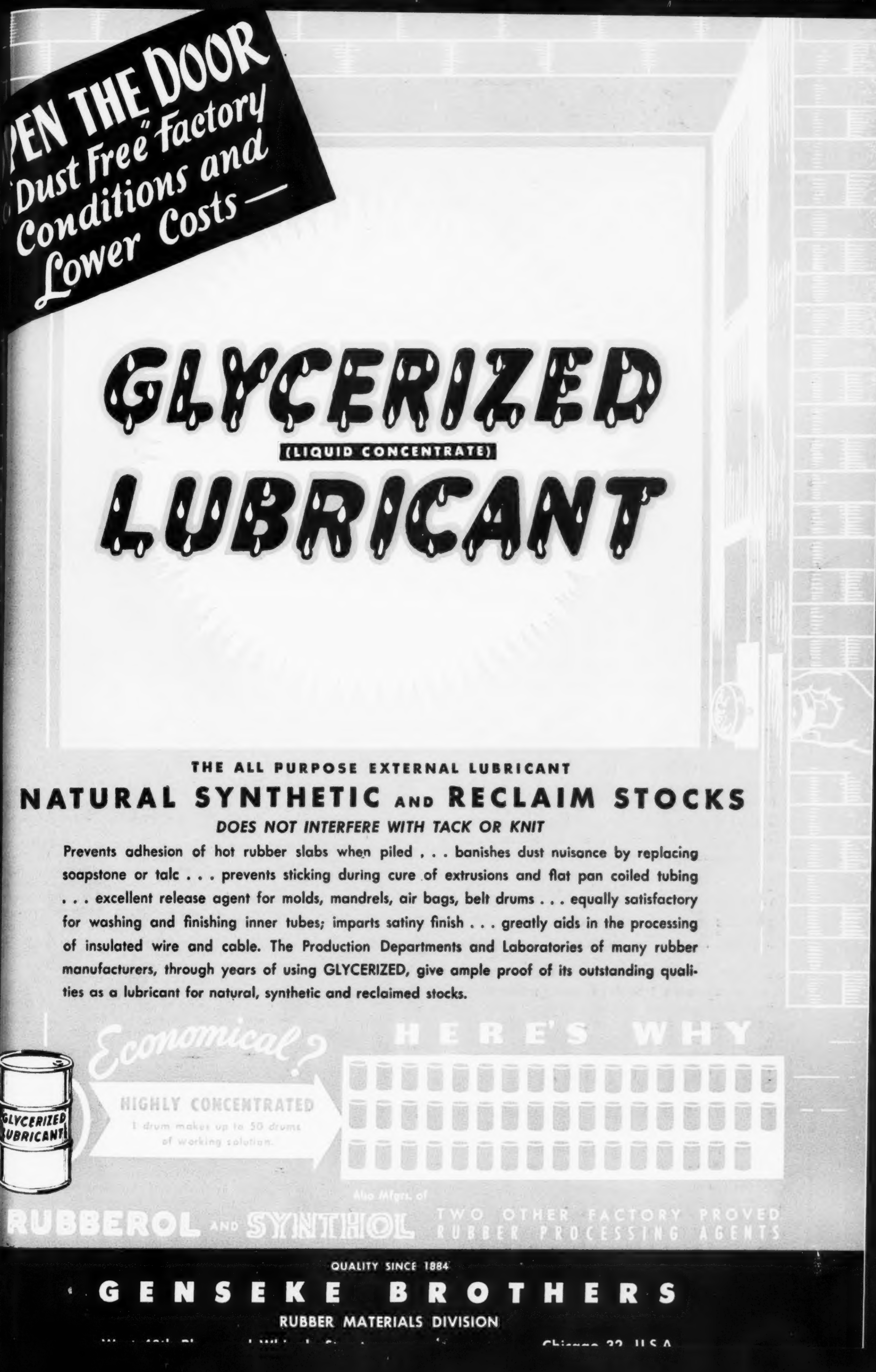

PEN THE DOOR
"Dust Free" Factory
Conditions and
Lower Costs—
GLYCERIZED
(LIQUID CONCENTRATE)
LUBRICANT
THE ALL PURPOSE EXTERNAL LUBRICANT
NATURAL SYNTHETIC AND RECLAIM STOCKS
DOES NOT INTERFERE WITH TACK OR KNIT
Prevents adhesion of hot rubber slabs when piled . . . banishes dust nuisance by replacing soapstone or talc . . . prevents sticking during cure of extrusions and flat pan coiled tubing . . . excellent release agent for molds, mandrels, air bags, belt drums . . . equally satisfactory for washing and finishing inner tubes; imparts satiny finish . . . greatly aids in the processing of insulated wire and cable. The Production Departments and Laboratories of many rubber manufacturers, through years of using GLYCERIZED, give ample proof of its outstanding qualities as a lubricant for natural, synthetic and reclaimed stocks.
Economical?
HERE'S WHY
GLYCERIZED LUBRICANT
HIGHLY CONCENTRATED
1 drum makes up to 50 drums of working solution.
Also Mfgrs. of
RUBBEROL AND SYNTHOL
TWO OTHER FACTORY PROVED RUBBER PROCESSING AGENTS
QUALITY SINCE 1884
GENSEKE BROTHERS
RUBBER MATERIALS DIVISION

ported and unsupported sheeting, welting, coatings, and plastisol or organisol coated fabrics, Pycal 170 is represented as a mobile liquid with a slight odor, a specific gravity of 0.943, a melting point around 35° F., a viscosity of 33 centipoises (25° C.), and an acidity (as acetic acid) of less than 0.3%.

## Dry Blending Vinyl Resin—Pliovic DB80V

A NEW dry blending grade of vinyl resin has been added to the Pliovic line of polyvinyl chloride resins of The Goodyear Tire & Rubber Co., Akron, O. Called Pliovic DB80V, the new resin is described as possessing exceptionally good dry blending properties which make possible free-flowing, dry mixes without subjecting the blend to high heat and lengthy milling cycles on conventional mills or Banburys.

The particle size and shape of the resin are credited with making possible the superior properties described above. Liquid plasticizers are reportedly absorbed in such a manner that the mix does not become "wet," but flows freely. The new product is recommended for use in garden hose, wire insulation, and other molded and extruded items.

## Super-Tough Silicone Rubber

A NEW silicone rubber with a tear strength that averages 190 pounds per square inch has been developed by General Electric Co., Pittsfield, Mass., according to a recent report. Available in three grades, 15060, 15080, and 15081, all of which have the thermal properties of standard silicone rubber, the new elastomer is described as having tear strength two to three times greater than any silicone presently on the market. High resistance to oils, including those with a synthetic base, at temperatures up to 375° F. is another characteristic which is claimed for the product.

Named Super-Tough, the silicone rubber is recommended for use as a gasketing material in aircraft applications and in chemical processing equipment where high temperatures, pressure, or vacuum exists, and as molded ducts and connectors in hot air lines where oil mist is present. The flexibility range for all grades of the new material is given as —65 to 550° F. In addition, grade 15081 is described as having very low compression set properties.

## Lead Stabilizer—Stayrite 229

A NEW lead compound for stabilizing halogen-containing organic materials has been developed by Witco Chemical Co., 260 Madison Ave., New York, N. Y. As described in the company's Technical Service Bulletin S-8, Stayrite 229 is unusually effective in formulations subjected to severe temperatures and as a heat stabilizer in opaque and rigid polyvinyl chloride. In this latter application the highly reactive lead content of the new material functions to eliminate the hydrogen chloride released during heat degradation. The compound is also recommended for stabilizing chlorinated paraffins and as a curing agent for chloro-sulfonated polyethylene.

Composed of basic lead salt, Stayrite 229 is a white powder with a specific gravity of 5.9, a refractive index of 2.0, and a litharge content of 88%. It is insoluble in water and solvents. Its high refractive index reportedly permits it to function both as a pigment and as a screening agent for ultra-violet light; while the high efficiency of the compound is said to reduce the amount required in a formulation to one part or two parts per 100 parts resin.

## New Marco Polyester Resin

A NEW, light-stable polyester resin designed for laminates such as awnings, greenhouses, and other outdoor applications has been developed by the Marco products department, plastics division, Celanese Corp. of America, New York, N. Y. Described together with other resins in a 20-page illustrated brochure, "Marco Polyester Resins," the new material is supplied in liquid form which may be converted into the solid state by application of moderate heat or at room temperature through the use of a special catalyst system. In castings, the new resin reportedly retains 98% or more of its original light transmission following 1,500 hours' exposure to Fade-Ometer tests.

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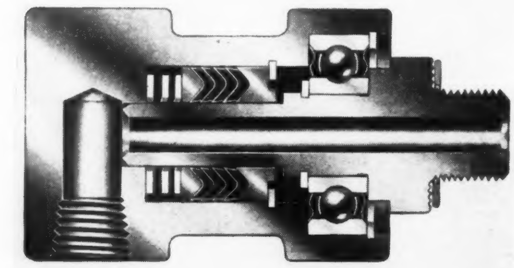
# New Machinery



Type NV Revolving Joint for Air and Hydraulic Service

## Barco Revolving Joint

AN IMPROVED, light running revolving joint, designated Type NV, for connecting air or hydraulic lines to clutches, power transmission drive units, chucks, and other rotating machine parts has been developed by Barco Mfg. Co., Barrington, Ill. Built with an inside diameter of ¼-inch, the joint is suitable for use at temperatures up to 180° F. and pressures up to 300 psi. for air or 1,500 psi. for liquids. Maximum speed recommended is 2,500 rpm. for normal applications.

Connection to the rotating machine is made by screwing the steel shaft of the joint into the machine hub. Either piping or flexible hosing may be attached to the joint's stationary end. Features of Type NV include: a one-piece bronze casing; spring loaded V-ring seals; hardened and ground steel shaft; and permanently lubricated, sealed ball bearings.

## Warning Device for Magnetic Separators

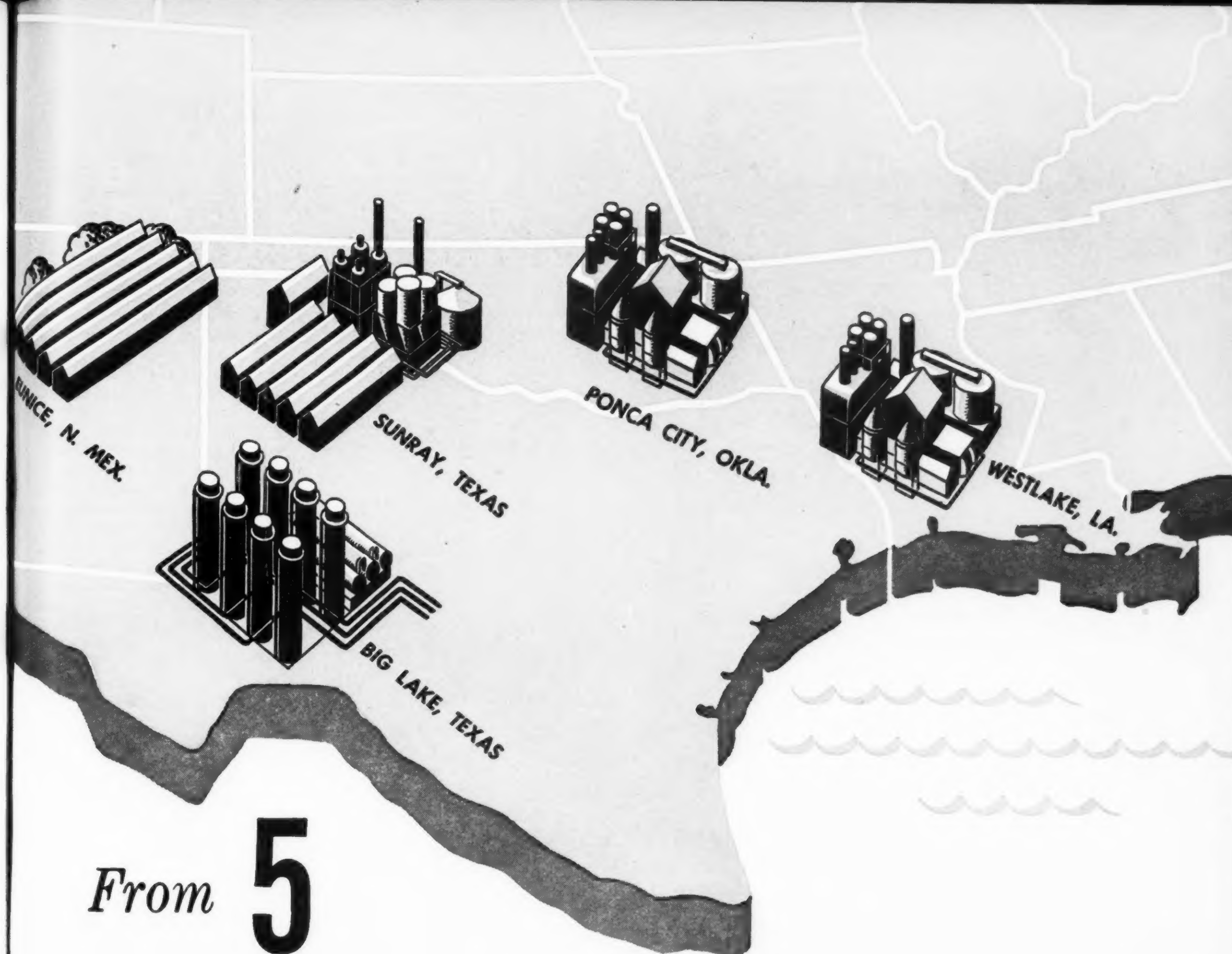
THE perfection of an automatic alarm system that warns personnel when a magnetic separator has collected a given quantity of ferrous metal has been announced by Eriez Mfg. Co., Erie, Pa. Purpose of the unit is to eliminate the possibility of human error in the periodic cleaning of a production magnet's face.

Called Magnalarm, the unit is said to result in a saving of man-hours and production time by guaranteeing the protection of machines from damage and of products from contamination by tramp iron and the like. The device consists of a sensitive ferrometer that constantly measures the quantity of tramp iron accumulated on the magnet's surface. When a predetermined volume is reached, the Magnalarm reacts on a circuit to trip a standard alarm (buzzer, light, etc.). In this way maintenance men are notified of the impending danger of an overloaded surface.

## Sheet Tension Control Device

THE maintenance of a constant fabric tension in the processing of film and sheeting has long been an important prerequisite to efficient manufacture of high-quality product. Excessive crush and reduction in width of the film are common results of poor tension control.

To eliminate these conditions and to provide a tension control device that also may function as an emergency stop in the event of a break in the film, Link Engineering Co., Detroit, Mich., has developed the Lod-Cap. This device, installed as a support to one end of an idler roll, records by air pressure the force exerted on the roll by the passing sheet. Balancing of this force may then be accomplished by manual changes or by automatic control through instruments to an accuracy of 0.1%. The company reports that the unit is currently being employed in the processing of polyethylene film, in which capacity it is placed on the idler roll situated between the let-off roll and the wind-up roll. Automatically operated, this particular Lod-Cap arrangement controls sheet tension by means of a diaphragm operated brake assembly mounted to the shaft of the let-off roll and activated by air pressure from a recorder-controller. A usable full-scale cyclic response of three cycles per second can be obtained to provide emergency stops in the event of sheet breakage.




*From* **5**

*Witco-Continental Plants . . .*

# A COMPLETE LINE OF CARBON BLACKS

**FURNACE BLACKS**

*Continex SRF, SRF-NS*
*Continex HMF*
*Continex HAF*
*Continex FEF*

**CHANNEL BLACKS**

*Continental AA (EPC)*
*Witco No. 12*
*Continental A (MPC)*
*Witco No. 1*
*Continental F (HPC)*
*Witco No. 6*
*Continental R-40 (CC)*

## WITCO CHEMICAL COMPANY
## CONTINENTAL CARBON COMPANY

**260 Madison Avenue, New York 16, N. Y.**

AKRON • AMARILLO • LOS ANGELES • BOSTON
CHICAGO • HOUSTON • CLEVELAND
SAN FRANCISCO • LONDON AND
MANCHESTER, ENGLAND

Produced in six models, this equipment is available for working ranges of from 0-50 to 0-12,000 pounds of force. Modifications of the control device have been developed by Link for use in weighing bulk material and for indicating and controlling rope and cord tensions during manufacture.

## Heat Cabinet for Tester

Dillon Universal Tester with Heating Cabinet

THE development of an electrically heated cabinet for use in combination with a Dillon universal tester to determine the elongation properties and breaking points of rubber, plastics, adhesives, etc., when subjected to heat, has been announced by W. C. Dillon & Co., Inc., Van Nuys, Calif. Design of the heating chamber originated from government sponsored university research, and Dillon modified its tester to accommodate the unit.

The cabinet, temperature of which is controlled by a pyrometer, is constructed of insulating board with slits in top and bottom for allowing the specimen strip access to the gripping fixtures of the testing machine. Predetermined heats are applied as pull is simultaneously exerted by the machine. The Dillon unit used in this capacity is the Model L, made to the customer's specifications of extra-tall pressure columns and side width. In this model machines with capacities from 0-250 pounds to 0-10,000 pounds are available for tensile, compression, transverse, or shear tests. In addition to the heat cabinets, water chambers and cold cabinets may also be used with the tester.

## High-Temperature Revolving Joint

DEVELOPMENT of a revolving joint capable of withstanding temperatures up to 550° F. at steam pressures up to 300 psi. has been announced by Rotherm Engineering Co., Inc., Chicago, Ill. The unit is manufactured in sizes from ½-5 inches and is available with stationary or rotating syphons with left- or right-hand threads.

Rotherm Revolving Joint

The self-contained type of joint that requires no mounting bracket, and the bracketed and mounted type that uses solid piping are both produced. In operation, rotation takes place with reportedly low turning torque against a flat, spring seated carbon face that alines itself with the roll bearing.

## Radiant Heating Unit

A NEW type of electric radiant heater, said to emit rays in the far-infrared field, has been developed by Cleveland Process Co., Cleveland, O. General applications of the unit include such uses as baking, curing, drying, plasticizing, and other heat processing where temperatures of 400-500° F. are required. Heaters with ratings up to 1,600° F. can also be supplied for applications involving higher temperatures.

The ovens consist of single or multiple units with various panel

# *Introducing--*

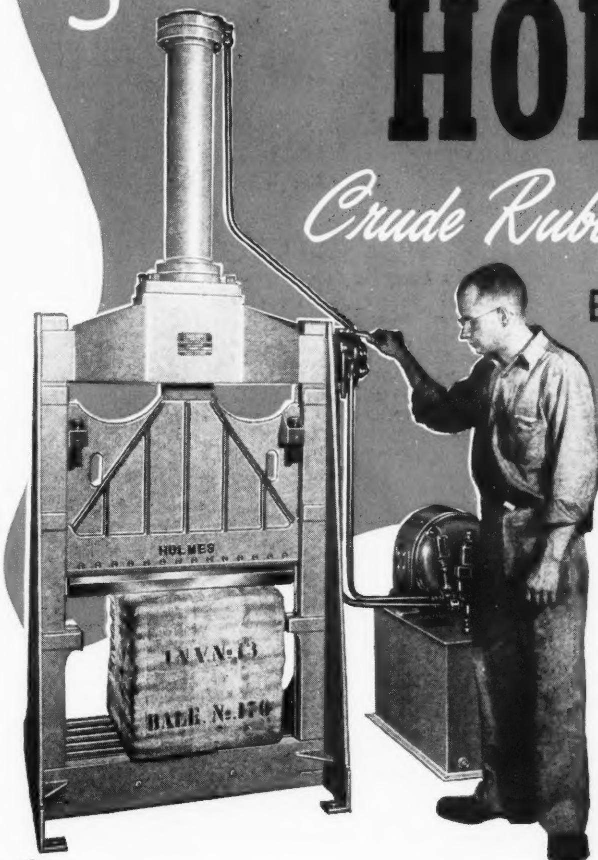
the new and improved

# HOLMES

## *Crude Rubber Bale Cutter*

**ENGINEERED FOR TOP PERFORMANCE**

**saves time • speeds output • cuts costs**



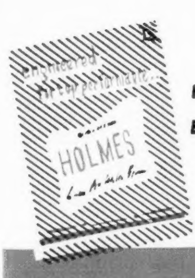

**If you cut crude rubber bales in your plant--regardless of how you do it--it will definitely pay you to find out how the new and improved Holmes Crude Rubber Bale Cutter can save your time...increase your production...and...decrease your costs.**

**The new and improved Holmes Crude Rubber Bale Cutter is a complete, ready-to-operate hydraulic unit including pump, 30 gal. oil tank, and motor.**

**DESIGNED FOR MAXIMUM SAFETY**

**Previous models of the Holmes Crude Rubber Bale Cutter have been widely used throughout the rubber industry for many years. In plant after plant they have conclusively demonstrated their high efficiency...low operating cost...and...maximum safety.**

**The new and improved Holmes Crude Rubber Bale Cutter incorporates all the features of earlier models...and...is augmented by many important new developments besides. While it is engineered for top performance--it is also designed to provide the utmost safety for the operator. What does it cost? You'll be surprised at its unusually low price.**




***Send for this Holmes Crude Rubber Bale Cutter broadside --TODAY***

**WRITE OR WIRE FOR SPECIFIC DETAILS--regardless of your particular requirements. With more than 50 years know-how specializing in machinery and molds for the rubber industry--Holmes can help you solve your problems, too, just as they have for so many others. No obligation, of course.**

***Stanley H.* HOLMES *Company***

***Successor to Holmes Brothers, Inc.***

**440 N. Sacramento Blvd., Chicago 12, Ill.**

**Clepco Electric Radiant Heater**

arrangements for complete assemblies. A single heating unit is composed of a fused quartz tube, 48 inches in length, in which is enclosed a heavy-duty nickel-alloy heating element. The element is completely sealed and supported along its full length inside the acid-proof tube. Each unit has an individual stainless steel reflector in which it is secured by a supporting and connection bracket at each end. Capacities of the individual units range from 100-1,000 watts per linear foot.

The advantages claimed for the Clepco radiant heaters include: inertness to corrosive vapors; safety from flashing of inflammable volatiles; lack of heating lag; capable of automatic control; and efficient, uniform heating.

## Brazil

(*Continued from page 660*)

The reduction is held partly due to the cessation of rubber smuggling from Bolivia into Brazil (an important factor in 1952), following pegged price increases in Bolivia. In fact this price increase is said to be causing a reverse movement, that is, Brazilian rubber is going to Bolivia. Another cause of reduced available rubber here is found in indications that Amazon producers are holding back stocks, presumably gambling on further increase in official prices if a shortage of rubber for the local manufacturing industry makes itself felt.

It is to be noted that there have been no imports of rubber into Brazil since May, 1953; available figures put total imports for the first eight months of 1953 at 360 long tons, against 8,140 tons in the same period of 1952. Meantime local consumption continues to rise. In 1954, two new rubber factories will be in operation, and it has been calculated that rubber requirements in the first half of that year will be 18,300 metric tons,[1] and 21,000 tons in the second half.

[1] One metric ton = 0.98-long ton.

## Goodyear in Indonesia

Expansion of the Indonesian plant of the Goodyear Tire & Rubber Co. to enable it to supply all of the car, truck, and bicycle tires and tubes demanded by that country has been announced. Located at Bogor, West Java, within easy transportation distance of Djakarta, the country's capital, the plant uses Indonesian natural rubber exclusively for its products.

Facilities were granted to Goodyear by the government for import of machinery needed for the expansion and modernization program, completion of which is expected in late 1954. After completion, the plant is expected to be the largest in the Far East outside of Japan.

The program provides for the production of 190,000 tires for cars, 173,000 truck tires, 328,000 inner tubes for both, 2,600,000 cycle tires, and 2,100,000 cycle tubes.

Indonesia at present has approximately 100,000 cars and trucks in circulation. Local assembly of these vehicles is carried on by several United States and Dutch auto companies, with assembly by West German firms scheduled to begin this year.

# New Goods

## High-Strength Rayon Cord Truck Tire

U. S. Royal Super Fleetway

A NEW truck tire, reported to be the first commercial tire made with supertenacity rayon cord that is 20% stronger than ordinary rayon, was announced recently by United States Rubber Co., Rockefeller Center, New York 20, N. Y. The rayon cords in the carcass, which are bonded together with plastic resins, are said to result in 79% more resistance to flex fatigue and 20% more resistance to rupture.

Known as the U. S. Royal Super Fleetway, the new tire has the additional features of 1½ times more tread rubber, deeper outer tread and thicker undertread, and individual rubber supports for each rib. Results claimed for these features include reduction in sideslip with improved road contact.

Prices for the new product will be 12½% higher than for the regular U. S. Royal Fleetway tires.

A Super Fleetway tire in all nylon construction is available for severe service at prices 15% above those for the new rayon product.

## Mud and Snow Tire

The Fisk Inter-Urban, a new mud and snow tire which reportedly provides the motorist with up to 25% faster starting on packed snow and with improved riding ease on open highways, also is being marketed by U. S. Rubber. The construction features of the new product which are credited with these improvements include extra-long tread fingers; wide tread grooves; and angled tread pattern. Both the standard and the white sidewall models of the tire are available.

## Vinyl Shower Curtains

A NEW spring line of shower curtains, made from heavy, eight-gage, specially compounded, soap-resistant vinyl film of the Goodyear Tire & Rubber Co., is being manufactured by Hygiene Shower Curtain Mfg. Co. Three basic patterns, each of which appear in eight different color schemes, make up the new product lines.

Matching bathroom window curtains of the same vinyl film are expected to be available soon after the marketing of the shower curtains.

## Oil Hose for Ship Refueling

A NEW hose for refueling ships at sea has been announced by The B. F. Goodrich Co., Akron, O. It is reported that, prior to this time, weight limitations on hose of this type prohibited the use of units larger than six inches in diameter. The new product, however, boasts a seven-inch bore and is claimed to weigh less than the conventional hose, even when both are filled with fuel. The use of the company's Flexseal ends in place of heavy metal nipples is credited with making possible much of the weight saving realized for the new unit.

## Adhesive for Foam Rubber

A WHITE, one-part adhesive for foam rubber splicing, where tack loss is essential, and exceptionally soft seam is required, has been announced by Rubber & Asbestos Corp., Bloomfield, N. J. Designated Padmaster 19 White, the new adhesive claims improved grab over previously existing formulations and, because

of its embodied pigments, reports bonding of foam to foam in an almost invisible seam. The product, which reportedly loses its tack within four hours after application, is said to retain softness even in heavy seams or on outside perimeter bonding (because it requires no separate accelerator that might continue vulcanizing the adhesive long after application).

Bondmaster 19 White Foam Fabricating Adhesive is supplied as a liquid, capable of dilution with toluol, and is applied by brush to each piece of foam to be bonded. Specifications include: viscosity, 1,200-1,800 centipoises; base, synthetic; tack life, ½ hour; weight, about seven pounds per gallon; solids content, 15%; odor, aromatic; and storage life, a period of more than six months.

## High HP Capacity V-Belt

AN IMPROVED V-belt that has a horsepower capacity 40% greater than for standard V-belts has been developed by Raybestos-Manhattan, Inc., Passaic, N. J. Known as the R/M Super-Power V-Belt, the new product makes possible the use of drives with narrower sheaves because fewer belts are required for the same power demands. In addition, the new belt is reported to have practically no stretch, thus greatly reducing belt matching problems.

Other advantages claimed for the new belt over conventional articles include: longer service life; greater shock resistance; less take-up maintenance; and smoother running. Constructed throughout of synthetic rubber with an incorporated synthetic fiber strength member, the belt is oil-proof, non-sparking, and heat resistant.

## Portable Skating Rink

A PORTABLE ice skating rink consisting of a lining of Bakelite Krene vinyl plastic and a small wire fence is available for converting a backyard into an ice skating site. Developed by Bilnor Corp., Brooklyn, N. Y., in various sizes, including a standard 24-foot circular unit, the collapsible rink requires only a few minutes to set up or disassemble.

The Krene liner, stretched over a section of reasonably level ground, covers the low fence with its flexible side walls. The peripheral liner-coated fence acts as a dam for two to three inches of water and, with the aid of cold weather, an ice skating rink is born.

## Neoprene Paper Caps

DISPOSABLE paper work caps, made of heavy Kraft paper treated with neoprene synthetic rubber, are being produced by Record Industrial Co., Philadelphia, Pa. The Neo-Caps were developed by safety engineers of E. I. du Pont de Nemours & Co., Inc., for use in one of the company's chemical plants to protect employes against drippings of acid and other chemicals. Cloth caps had formerly been used in this capacity, but attempts at laundering usually resulted in disposal of the caps long before they were worn out.

The prime advantage of the new cap is economy; the cost is about 30% less than that for the cloth product. Manufactured from pulp to which a small percentage of neoprene latex has been added during the paper-making process, the paper reportedly possesses unusually high wet strength and resistance to both acids and alkalies. The finished caps, fabricated by sewing and containing a leatherette sweat band and reinforced visor, are claimed to be water repellent, tear resistant, and flame retarding. A full range of sizes of these work caps is available from the manufacturer.

## Foam Rubber for Shoes

"AIRFOOT," a new cushioning material described as possessing exceptionally high qualities of porosity, resiliency, and good tensile strength, has been developed by Goodyear Tire & Rubber Co., Akron, O., for shoe product application. Light-tan in color, the new material was designed for the specific properties of high compression and low weight.

Although manufactured by the Airfoam division of Goodyear, "Airfoot" is not Airfoam, but an entirely new foamed material. It was introduced publicly at the Shoe Manufacturers Conference in Cincinnati, O., on February 15.

# Editor's Book Table

## BOOK REVIEWS

**"Latex in Industry."** Second Edition. Royce J. Noble. *The Rubber Age*, 250 W. 57th St., New York 19, N. Y. Cloth, 6 by 9 inches, 912 pages. Price $15.

Noble's "Latex in Industry" has become a classic in its field, and this new edition should receive a wide welcome. This edition, with 912 pages, is greatly enlarged over the 384-page 1936 edition. Most of this increase is in the bibliographies, which have gained 400% in length; while the text has grown only 50%. The greater increase in the bibliography sections is all to the good, however, since the references are very valuable parts of the book. The greatest increase in descriptive matter is in that part devoted to latex testing, where the length has been doubled, and testing has been made Part III of the new edition.

This reviewer's criticisms include the use of the expression "in recent years" to denote time. Frequently the description using this term has been taken over bodily from the first edition where pre-1936 is meant; while at other points the expression means just previous to 1953. Because of the considerable progress in latex technology in the intervening 17 years, this usage is very confusing.

Actually, progress in the above-mentioned 17 years has not been too well covered in this second edition. It is true that the text of the chapters on artificial latices has been increased from 12 to 36 pages, but that coverage hardly begins to indicate the importance which these latices have attained during that time. Likewise, the relatively short chapter on "Porous Rubber" does not suggest the overwhelming importance of foamed rubber in the current latex picture.

Also, on page 603, it is stated that, "With a favorable cost situation it has been estimated that sponge production would exceed 100 million pounds per year"; while current estimates for foam production in 1953, the year in which the book was issued, place total production above 185 million pounds.

Another minor criticism would be the use of the terms, "accelerator—one part" or "antioxidant—one part," when such statements can have very little meaning. One part of one accelerator would, of course, give a very different latex compound from one part of another.

When account is taken of the extreme care with which the industry guards the details of its latex processes, and of the width of the field which this book attempts to cover, the above criticisms appear trivial, however. Just for the bibliographies alone, this modern edition should be on every latex worker's bookshelf. For the beginner, no better introduction to "Latex in Industry" can be recommended.

P. D. Brass

**"Plastics Moulding Engineering."** M. Freund. Sir Isaac Pitman & Sons, Ltd., London, England. Available from the British Book Centre, 122 E. 55th St., New York 22, N. Y. Cloth, 5½ by 8½ inches, 418 pages. Price, $10.

An analysis of engineering principles and practice in the plastics molding industry, this volume emphasizes the technical aspects of the subject and points out the problems which can only be solved by further research and engineering advances. While filling a definite need, the book is handicapped by being somewhat out of date; the latest bibliography references are for 1947, and many of the newer developments in materials and molding techniques are omitted.

Following an introductory chapter, come chapters devoted to tooling for compression, transfer, and injecting molding; stresses in molds; molding of large components; tolerances and accuracy of moldings; mechanical properties and behavior of moldings; threads and inserts; moldings for electrical applications; heat in the plastics molding shop; hydraulics in the molding shop; and unusual mold designs. Further data are given in five appendices, and there is also a subject index.

**"Werkstoffkunde und Allgemeine Einfuhrung in die Gummitechnologie.** (Knowledge of Materials, and General Introduction to Rubber Technology)," by Hero of Labor, Dr. Arthur Springer. Published by Fachbuchverlag G.m.b.H., Leipzig, 1952. Board, 6½ by 9 inches, 354 pages. Illustrated. Price, 12 marks.

Dr. Springer, technical director of Furstenwalde Tire Works, explains in his introduction that to further their aim of increasing amount and quality of output in the rubber industry while lowering costs, the authorities in East Germany had decided on

an educational program for trained and untrained workers. A training school in a factory, which eventually became a National Trade School for Rubber Technology, was set up in 1949, but it immediately became apparent that there was a serious lack of textbooks—well-known works were either out of print or not accessible. Consequently it was decided to publish a new series, "Fachkunde für die Kautschukindustrie" ("Professional Knowledge for the Rubber Industry"), which is to cover the entire field of rubber goods manufacture by the newest methods.

The present work, the first in the series, is devoted to the chemical-technological side of production and at the same time serves as a general introduction to rubber technology. The material is divided into 15 main sections; the first two consist mainly of propaganda; while the remaining parts deal with the nature and various forms of rubber, processing, compounding ingredients, curing and aging, formulation, preparation and testing of compounds, preparation of solutions, hard rubber and rubber-to-metal bonding, sponge rubber and hollow rubber goods, textiles in the rubber industry, and latex technology.

The material is set forth concisely, in easily comprehensible language, and is rendered still more accessible by numerous clear tables and illustrations (270 illustrations and 68 tables are listed in the two separate indices appended to the work, besides the general index). A feature of the work is a list of review questions at the end of each section.

The reader of the book will find interesting facts on the program of instruction planned for workers at different levels of experience and training, working conditions for apprentices, and vacations and health measures apparently introduced for all.

From the opening, propagandistic chapters, he will also glean news about the magnanimity of Soviet Russia toward East German Buna factories, United States preparations for World War III, and the monopolistic policy of Britain, France, and Holland in the Far East. He will note that the East German student is assured that a freedom movement is rapidly developing among the peoples in the Asiatic colonies of the three nations mentioned, and that this will eventually be powerful enough to wrest—among other things—control over natural rubber production from monopolistic capitalism.

## NEW PUBLICATIONS

**"ADM Sperm Oil Products."** Technical Bulletin 904A. Archer-Daniels-Midland Co., 2191 W. 110th St., Cleveland 2, O. 18 pages. Prepared in folder form, this publication contains the characteristics, chemical and physical properties, compositions, and solubility data of 12 oils and waxes as well as their suggested applications.

**"Hydraulic Presses and Equipment."** R. D. Wood Co., Philadelphia, Pa. 12 pages. This brochure presents representative units manufactured by the company for use in the rubber and the plastics industries. Specifications, illustrations, and applications of the machines are contained.

**"Chemigum N-6 and Chemigum N-7."** Techni-Guide CR-100-1. Goodyear Tire & Rubber Co., Inc., Akron, O. 5 pages. These two nitrile-type rubbers are discussed as to physical properties, compounding recipes and resulting test data, processing information, and applications.

**"Cyclonaire Portable Fume Washer."** Bulletin FW-3. U. S. Stoneware Co., Akron, O. 4 pages. Technical data, drawings, performance charts, and dimensional information on this machine, which is recommended for fume removal, are contained in this catalog insert.

**"Phenyl Ethanolamines."** F-8280. Carbide & Carbon Chemicals Co., 30 E. 42nd St., New York 17, N. Y. 2 pages. This technical bulletin contains physical and physiological properties, shipping data, organic solvent solubilities, and application information on phenyl, phenyl di-, phenyl methyl-, and phenyl ethyl-ethanolamines.

**"Research and Control Instruments:** X-Ray and Analytical Equipment." North American Philips Co., Inc., Mount Vernon, N. Y. 64 pages. This paper bound reference book covers such instruments as electron microscopes, Geiger-counter X-ray diffractometers, computers, etc.

**"Witco Gelling Agents for Polyvinyl Chloride Compositions."** Technical Service Bulletin G-5. Witco Chemical Co., 260 Madison Ave., New York 16, N. Y. 5 pages. New applications of the company's sodium and aluminum stearate in the field of vinyl plastisols and organosols through use as gelling agents for PVC compositions and in producing plastigels are described in this bulletin. Use of these metallic soaps in vinyl dip and knife coating formulations provides a method for controlling viscosity and achieving stability, according to the report. Recommended methods of incorporating the agents (as pregels) and measurement of the proper amount of the gelling agents are subjects also covered.

**"B. F. Goodrich Transmission Belts."** The B. F. Goodrich Co., Akron, O. 34 pages. This catalog describes and illustrates the construction features of various industrial belts, including belts designed for specific applications, and outlines a method of making the Plylock belt joint.

**"B. F. Goodrich Farmer's Handbook and Almanac."** 16th Edition, 1954. 62 pages. Contained in this annual publication are informative tips for farmers and articles of general interest by some well-known authors and of specific farmer interest by authorities on farming.

**"Materials for Product Development, 1953."** Clapp & Poliak, Inc., 341 Madison Ave., New York, N. Y. Cloth, 6 by 9 inches. 265 pages. Price, $7.50. This book is a compilation of the proceedings of the Basic Materials Conference held in conjunction with the First Basic Materials Exposition in New York, N. Y., in June, 1953. The 18 addresses made are grouped according to the following headings: "Economics of Engineering Materials"; "High Strength with Low Weight"; "High- and Low-Temperature Service"; "Atomic Energy"; "Electrical and Electronic Service"; "Materials Selection and Specification"; and "Coordination in Selection of Materials." Those topics of particular interest include: "Sandwich Construction," dealing with reinforced plastics in aircraft manufacture, by N. E. Wahl, of Cornell Aeronautical Laboratory, Inc.; "Molded and Extruded Plastics," covering general properties and applications of plastics, by H. M. Quackenbos, of Bakelite Co.; and "Insulating Materials," treating of the general requirements of insulators and the use of polyethylene, Teflon, polymonochlorotrifluoroethylene, and polystyrene in this capacity, by A. J. Warner, Federal Telecommunication Laboratories, Inc.

**"Silicone Notes."** Data Sheet 5-104. Dow Corning Corp., Midland, Mich. 7 pages. The reported experiences of all leading users of the company's silicone mold release agents for plastics are summarized in this catalog insert. Application methods and optimum concentrations are given for fluids, emulsions, solutions, and coating resins with acrylics, epoxies, phenolics, polyesters, vinyls, and silicones.

**"ASTM Standards on Textile Materials (with Related Information)."** November, 1953. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Paper, $5.25. 696 pages. Prepared by the Society's Committee D-13, this edition gives specifications, tolerances, methods of testing, and definitions and terms used in textile manufacture. Some 105 standards, including 80 test methods, are given.

**"1954 Guide to Improved Packaging with Bakelite Plastics and Resins."** Booklet G-21. Bakelite Co., New York, N. Y. 8 pages. This publication describes and illustrates the latest applications of molded and blown plastics, coatings, adhesives, film, and rigid sheet materials in packaging and display fields. Plastics and resins included in this survey include polyethylene, phenolic, styrene, and polyvinyl chloride.

**"Sodium Dispersions."** U. S. Industrial Chemicals Co., New York, N. Y. 30 pages. This attractive and comprehensive booklet, prepared to enlarge upon the material contained in the first technical bulletin published on the subject in 1950 by National Distillers Chemical Co., reviews developments on sodium dispersion over the past three years and presents data on the properties, preparation, and industrial applications of the materials in organic chemical reactions employing sodium.

**"Quaker Transmission Belting."** Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia, Pa. 4 pages. Described in this illustrated catalog insert is the company's complete line of flat transmission belts, with recommended uses, specifications, construction data, sizes, and lengths.

"**Engineering for the Rubber and Plastics Industry.**" Giffels & Vallet, Inc., L. Rossetti, Detroit, Mich. 14 pages. Outlined in this illustrated brochure are the services available, projects completed, and companies served by this firm of associated engineers and architects. Twenty-three companies, some with as many as four projects, have employed this construction and design firm to handle the problems involved in plant construction and modernization and in developing material handling systems, new equipment, and new processes.

"**Comparison of Sterling MT and a Competitive MT Black in Natural Rubber and in GR-S 1000.**" Cabot Technical Report No. RX-17, November, 1953. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8 pages. The physical properties resulting from the incorporation of MT blacks in various loadings in natural rubber and GR-S 1000 are given.

"**Stan-Tone Dry Colors.**" Bulletin No. 02-175-0-8-53. Harwick Standard Chemical Co., 60 S. Seiberling St., Akron 5, O. 2 pages. This catalog insert describes the chemical and physical properties, including the pigment type, of the company's line of dry colors for rubber and vinyls.

"**Rubber**—A Story of Romance and Science." United States Rubber Co., Rockefeller Center, New York 20, N. Y. 34 pages. This brochure, a revised edition of a similar U. S. Rubber publication entitled, "Romance of Rubber," describes in general the collection and preparation of natural rubber, the manufacture of synthetic rubber, and the applications to which these materials are put. Profusely illustrated, the booklet is intended to acquaint school children with the rubber products they use.

"**Flexibility**—New Dimension in Product Design." Monsanto Chemical Co., Springfield, Mass. 16 pages. The various uses to which Monsanto's Opalon vinyl resins and compounds have been put and the properties of the vinyl that lend themselves to these applications are described and illustrated.

"**Fumaric Acid.**" Technical Bulletin No. 0-102. Monsanto, St. Louis, Mo. 6 pages. The typical addition and esterification reactions of fumaric acid and the properties of the resulting products are discussed in this booklet.

"**Basic Engineering Data on Industrial Rolls.**" Report No. 1. Rodney Hunt Machine Co., Orange, Mass. 2 pages. "Body Roll Deflections" is the subject of this first in a series of reports intended to assist in the design and selection of rolls for specific plant applications. Contained in the publication are the modulus of elasticity for seven materials commonly used for rolls, deflection equations, and means of determining the moment of inertia in various roll bodies.

"**Ace-Flex Tubing.**" Bulletin 66-D. American Hard Rubber Co., New York, N. Y. 4 pages. Physical properties, chemical resistance, standard sizes, and suggested applications for this flexible, transparent tubing are presented here.

"**Automatic Testing Program Controllers.**" Bulletin 48. Tinius Olsen Testing Machine Co., Willow Grove, Pa. 4 pages. The company's complete line of electronic controllers for automatic production and research testing programs is described. Included in the pamphlet are controllers for automatic production testing, proof testing, yield strength by the extension under load method, stress cycling, strain cycling, and cross-head cycling.

"**Lubrication.**" February, 1954. The Texas Co., 135 E. 42nd St., New York 17, N. Y. 12 pages. Contained in this magazine is a well-written, comprehensive article, "Rubber Processing," which covers the subject from the raw materials (synthetic, natural, and scrap rubber) through the steps of breakdown, mixing, calendering, extruding, curing, etc., to the final product. In addition, the machines involved in the processes are discussed quite thoroughly in regard to the question of their lubrication requirements.

"**How to Work with Airfoam Super Cushioning.**" Goodyear Tire & Rubber Co., Akron, O. 72 pages. Intended as a handbook on the application of Airfoam upholstery material, this booklet describes fabrication, covering, etc., and provides some specifications on the physical properties of the product.

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# MARKET REVIEWS

## RUBBER

ONLY light trading on both the rubber spot and futures markets was noted during the period from December 16 to January 15, although prices were relatively steady despite the lack of business and the holiday influence. Early in the period there was an unloading movement of Far Eastern surplus stocks on the spot market as shippers began to free rubber which had been held back awaiting the GSA stockpile rotation announcement on December 9. In general, supplies were plentiful throughout the period as factories purchased in small to moderate quantities, usually in fill-in lots.

Buyers on the spot market showed themselves to be sensitive to market rumors; a sharp spurt in buying occurred toward the end of December because of the Indo-China situation, and another spurt came early in January on foreign rumors of a GR-S price advance and heavier stockpile buying by GSA. In both cases the flurry of interest was short-lived, and factories moved out of the market to await further developments.

Factory buying during the first half of January indicates a monthly total below that of January, 1953. Reports from Akron indicate that sales of manufactured products are not picking up so rapidly as they did a year ago. Truck tire sales, in particular, are said to be at very low levels.

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

| | Nov. 28 | Dec. 19 | Dec. 26 | Jan. 2 | Jan. 9 | Jan. 16 |
|---|---|---|---|---|---|---|
| R. S. S.: | | | | | | |
| #1 | 21.25 | 20.63 | 20.63 | 20.88 | 20.63 | 20.25 |
| 2 | 20.38 | 20.25 | 20.25 | 20.38 | 20.13 | 19.75 |
| 3 | 19.38 | 19.88 | 19.88 | 20.13 | 19.88 | 19.50 |
| Latex Crepe: | | | | | | |
| #1 Thick | 26.38 | 25.88 | 25.88 | 25.38 | 25.00 | 24.75 |
| Thin | 23.38 | 22.88 | 23.00 | 23.25 | 23.13 | 22.88 |
| #3 Amber Blankets | 17.38 | 18.00 | 18.00 | 18.13 | 17.88 | 17.75 |
| Thin Brown Crepe | 16.63 | 17.50 | 17.50 | 17.25 | 16.88 | 16.75 |
| Flat Bark | 15.50 | 16.00 | 15.88 | 16.00 | 15.88 | 15.50 |

All grades showed sluggish price movements; #1 Ribbed Smoked Sheets went from a high of 21.00¢ at the start of the period to a low of 20.25¢ at the close. #3 Amber Blankets, exemplifying the off-grades, went from 18.25¢ to 17.75¢ over the period. December monthly average spot prices for certain grades were as follows: #1 R.S.S., 21.07¢; #3 R.S.S., 20.00¢; #3 Amber Blankets, 18.15¢; and Flat Bark, 15.91¢.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

| Futures | Nov. 28 | Dec. 19 | Dec. 26 | Jan. 2 | Jan. 9 | Jan. 16 |
|---|---|---|---|---|---|---|
| Mar. | 21.20 | 20.35 | 20.25 | 20.50 | 20.27 | 20.05 |
| May | 21.30 | 20.40 | 20.25 | 20.50 | 20.30 | 20.10 |
| July | 21.30 | 20.40 | 20.25 | 20.50 | 20.27 | 20.15 |
| Sept. | 21.35 | 20.45 | 20.30 | 20.50 | 20.27 | 20.15 |
| Dec. | 21.39 | 20.45 | 20.35 | 20.50 | 20.42 | 20.15 |
| Mar. '55 | | 20.45 | 20.35 | 20.50 | 20.42 | 20.15 |
| Total weekly sales, tons | 2,150 | 1,290 | 230 | 710 | 640 | 770 |

Futures prices followed the lead of the spot market, although trading activity was even lighter and centered in switching operations. March futures started the period at a high of 20.75¢, but dropped to a low of 20.05¢ on January 15. Sales during the second half of December amounted to 1,420 tons, making a total for the month of 4,740 tons. Sales for the first half of January were 1,410 tons.

### Latex

DEMAND for *Hevea* latex over the period from December 16 to January 15 held up well despite the holiday and inventory season. Prices remained steady, and the differential over #1 Ribbed Smoked Sheets showed a slight tendency to harden, probably in anticipation of the wintering season when imports will drop while domestic demand can be expected to increase.

The high domestic inventories of natural latex appear to be in the hands of consumers rather than importers, since there has been no indication of heavy selling pressure on the market. Demand for delivery through the second quarter of 1954 has been good, and unsold bulk quantities of latex for first-quarter delivery are said to be quite limited.

The latex foam industry, which is the key to the domestic market, is generally optimistic over prospects for 1954, despite an anticipated decline in demand from the automotive people. Other major users of latex are also confident of good business during the year.

Latex consumption in foreign countries, particularly in Europe, is said to be increasing steadily, and price premiums for latex in Europe are reported to be higher than those in this country. If this condition of disparity continues, producers may withdraw increasing quantities of latex from the domestic market to take advantage of the higher European prices.

Final October and preliminary November domestic statistics on natural and synthetic rubber latices are given in the following table:

(All Figures in Long Tons, Dry Weight)

| | Production | Imports | Consumption | Month-End Stocks |
|---|---|---|---|---|
| Natural latex: | | | | |
| Oct. | 0 | 6,537 | 5,897 | 11,126 |
| Nov.* | 0 | 5,200 | 5,283 | 10,892 |
| GR-S latices: | | | | |
| Oct. | 3,639 | 15 | 3,719 | 4,990 |
| Nov.* | 3,705 | 10 | 3,546 | 4,652 |
| Neoprene latex: | | | | |
| Oct. | 753 | 0 | 660 | 1,133 |
| Nov.* | 754 | 0 | 530 | 1,061 |
| Nitrile latices: | | | | |
| Oct. | †733 | 0 | 312 | 737 |
| Nov.* | 352 | 0 | 255 | 781 |

*Preliminary.
†Includes adjustment of +62 tons applicable to prior months.

## RECLAIMED RUBBER

AFTER ending the year at a low level, demand for reclaim showed an improvement toward the middle of January as automobile manufacturers began to reach full production. Reclaim sales in December were about 10% below those of the preceding month, but January sales are expected to exceed November totals.

The outlook for reclaim during 1954 is somewhat uncertain in view of large inventories by tire manufacturers. In addition, the low price for natural rubber is expected to reduce demand for reclaim by the sole and heel industry.

Final October and preliminary November statistics on the domestic reclaimed rubber industry are now available. October figures, in long tons, follow: production, 23,534; imports, 115; consumption, 21,944; exports, 823; and month-end stocks, 30,692. Preliminary figures, in long tons, for November are: production, 21,172; imports, 112; consumption, 19,624; exports, 859; and month-end stocks, 31,700.

No changes were made in reclaim rubber prices during the period from December 16 to January 15, and current prices are:

**Reclaimed Rubber Prices**

| | Lb. |
|---|---|
| Whole tire: first line | $0.10 |
| Fourth line | .0875 |
| Inner tube: black | .15 |
| Red | .2425 |
| Butyl | .125 |
| Pure gum, light colored | .2425 |
| Mechanical, light colored | .135 |

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

## SCRAP RUBBER

CONDITIONS in the scrap rubber market during the period from December 16 to January 15 could only be described as dull. Although some orders were received during the early part of January for mixed auto tires, black and red passenger tubes, and No. 1 mixed peelings, the quantities involved were small. At that, this business brought some relief to scrap dealers after the stand-still noted during December.

While price advances took place on No. 1 peelings and both mixed and black tubes in the East, and on mixed auto tubes in Akron, dealers emphasize that all quotations could be regarded as nominal because of the lack of real activity.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

| | Eastern Points | Akron, O. |
|---|---|---|
| | (Per Net Ton) | |
| Mixed auto tires | $11.00 | $12.00 |
| S. A. G. auto tires | Nom. | Nom. |
| Truck tires | Nom. | 15.00 |
| Peelings, No. 1 | 40.00/41.00 | 40.00/42.00 |
| 2 | Nom. | 24.00 |
| 3 | 14.00/15.00 | Nom. |
| | (¢ per Lb.) | |
| Auto tubes, mixed | 2.50 | 2.50 |
| Black | 4.00 | 4.00 |
| Red | 9.75 | 10.00 |
| Butyl | 1.75 | 2.00 |

## COTTON FABRICS

THE anticipated improvement in demand for industrial fabrics took place late in the period from December 16 to January 15. During the latter part of December easier prices were noted in raincoat fabrics, drills, headlinings, and sateens, and these lower prices remained throughout the period as mills competed for business.

Toward the middle of January fairly active trading was noted in wide fabrics for February and early March delivery, with most demand being for drills, broken twills, ducks, and osnaburgs. Market observers believe that consumer inventories of all types of industrial fabrics are at unusually low levels throughout the country, and a general covering movement is looked for during the first quarter.

Other price movements in the period saw slight rises in osnaburg and duck prices; while chafer fabrics and certain headlining constructions held at previous levels.

### Cotton Fabrics

| | | | |
|---|---|---|---|
| **Drills** | | | |
| 59-inch 1.85-yd. | *yd.* | $0.37 | |
| 2.25-yd. | | .32 | |
| **Osnaburgs** | | | |
| 40-inch 2.11-yd. | *yd.* | .2425 | $0.245 |
| 3.65-yd. | | .16 | |
| **Ducks** | | | |
| 38-inch 1.78-yd. S. F. | *yd.* | $.35\frac{3}{8}$ | |
| 2.00-yd. D. F. | | .32 | |
| 51.5-inch, 1.35-yd. S. F. | | $46\frac{5}{8}$ | |
| Hose and belting | | 64 | |
| **Raincoat Fabrics** | | | |
| Printcloth, $38\frac{1}{2}$-inch, 64x60 | *yd.* | 1375 | .14 |
| Sheeting, 48-inch, 4.17-yd. | | 2025 | |
| 52-inch, 3.85-yd. | | $24\frac{3}{8}$ | |
| **Chafer Fabrics** | | | |
| 14.30-oz./sq. yd. Pl. | *lb.* | .71 | |
| 11.65-oz./sq. yd. S. | | .63 | |
| 10.80-oz./sq. yd. S. | | .6675 | |
| 8.9-oz./sq. yd. S. | | .68 | |
| **Other Fabrics** | | | |
| Headlining, 59-inch, 1.65-yd., 2-ply | *yd.* | .4825 | |
| 64-inch, 1.25-yd., 2-ply | | $.60\frac{1}{8}$ | |
| Sateens, 53-inch, 1.32-yd. | | .555 | |
| 58-inch, 1.21-yd. | | $.60\frac{3}{8}$ | |

## RAYON

A GENERAL review of rayon shows that 1953 was a year of mixed trends. Shipments through July were near the high levels set during the latter half of 1952, but they declined noticeably thereafter. Rayon stocks rose rapidly through October, but declined in November. Total shipments for the first 11 months of 1953 were 1,092,-300,000 pounds; while production was 1,111,800,000. Data for the first three quarters of 1953 showed that shipments of viscose high-tenacity yarn for tires and related uses tended upward, although the third quarter showed a seasonal decline.

A breakdown is now available of the third-quarter total of 131,000,000 pounds of tire cord and fabric produced. Of this total, 4,000,000 pounds were cotton tire fabric; 90,000,000 pounds were woven rayon tire fabric; 19,000,000 pounds were rayon tire cord; 5,000,000 pounds were nylon tire cord and fabric; and 13,000,000 pounds were cotton chafer fabric.

There were no changes in rayon tire yarn and fabric prices during the period from December 16 to January 15, and current prices follow:

### Rayon Prices

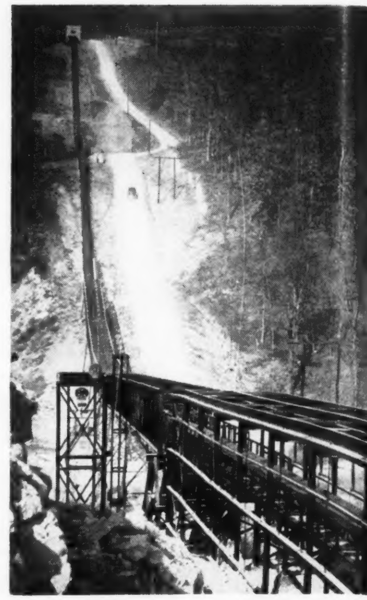
| | | |
|---|---|---|
| **Tire Yarns** | | |
| 1100/480 | $0.26 | $0.63 |
| 1100/490 | | .62 |
| 1150/490 | | .62 |
| 1165/480 | | .63 |
| 1650/720 | | .61 |
| 1650/980 | | .61 |
| 1820/980 | | .61 |
| 2200/960 | | .60 |
| 2200/980 | | .60 |
| 2200/1466 | | .67 |
| 4400/2934 | | .63 |
| **Tire Fabrics** | | |
| 1100/490/2 | | .72 |
| 1650/980/2 | .659 | .73 |
| 2200/980/2 | | .685 |

## Conveyor Belt System

OVER an isolated, wooded, rolling tract of land a few miles northwest of the southern Ohio town of Beverly there is now operating one of the world's longest permanent conveyor belt systems. Spanning a distance of some $4\frac{1}{2}$ miles, including the 500-foot Muskingum River, the belt transports coal at a rate of almost seven miles an hour from a strip mine to the new plant of the Ohio Power Co.

Nearly 800 tons an hour are handled by the 14-section system. Inclines and declines of as much as 12 degrees are traversed, and angles of up to 90 degrees are negotiated. The sections range in length from 500 to 2,964 feet in pulley to pulley distance, and terminate at a transfer point where the coal is dumped on to the following unit. Each section contains an endless rubber belt of twice its length.

The belting, manufactured and installed by The B. F. Goodrich Co., was hauled to the site of the conveyor system on rolls weighing up to $4\frac{1}{2}$ tons and joined at the ends by a portable electric vulcanizer. Motors capable of producing a total of 1,435 hp. are required to drive the conveyor system.



View of Conveyor Belt System Climbing 12-Degree Incline

## Plastic Camp Trailers

FIBROUS glass and Vibrin polyester resin are being fabricated into collapsible camp trailers by Hille Engineering Corp., Anaheim, Calif. Measuring 12 feet long, nearly seven feet wide, and four feet high in the traveling position, the new trailers can be expanded by means of a crank to a height of more than six feet. Metal braces support the molded plastic roof, and canvas sides extend from the roof to the plastic base when the trailer is in this expanded, camping position.

Weighing about ½ the weight of conventional camp trailers, these units can accommodate three persons, two in fixed bunks, and the third in a "drawer" type bunk which pulls out for use. Also contained in the trailer are a fuel unit, a two-burner stove, a built-in refrigerator, a 15-gallon water tank, and storage space. The canvas sides, which are removable, have windows for cross-ventilation.

## United States Rubber Statistics, October, 1953

(All Figures in Long Tons, Dry Weight)

| | New Supply | | | Distribution | | Month-End Stocks |
|---|---|---|---|---|---|---|
| | Production | Imports | Total | Consumption | Exports | |
| Natural rubber and latex, total | 0 | 46,729 | 46,729 | 46,744 | 657 | 114,191 |
| Rubber, total | 0 | 40,192 | 40,192 | 40,847 | 657 | 103,065 |
| Latex, total | 0 | 6,537 | 6,537 | 5,897 | 0 | 11,126 |
| Synthetic rubbers, total | *47,994 †9,176 | 797 | 57,967 | 58,515 | 1,677 | 166,724 |
| GR-S types‡ | *41,290 †92 | 765 | 42,147 | 46,150 | 455 | 129,655 |
| Butyl | *6,704 | 32 | 6,736 | 5,506 | 4 | 22,435 |
| Neoprene‡ | †6,784 | 0 | 6,784 | 5,443 | 915 | 10,138 |
| Nitrile type‡ | †2,300 | 0 | 2,300 | 1,416 | 303 | 4,496 |
| Natural rubber and latex, and synthetic rubbers, total | 57,170 | 47,526 | 104,696 | 105,259 | 2,334 | 280,915 |
| Reclaimed rubber, total | 23,534 | 115 | 23,649 | 21,944 | 823 | 30,692 |
| GRAND TOTALS | 80,704 | 47,641 | 128,345 | 127,203 | 3,157 | 311,607 |

*Government plant production.
†Private plant production.
‡Includes latices.
SOURCE: Chemical & Rubber Division, BDSA, United States Department of Commerce, Washington, D. C.

## Foreign Trade Opportunities

The firms and industries listed below recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

### Export Opportunities

Synthetic Moulders, Ltd., 53 Netaji Subhas Rd., Calcutta, India: dry colors for coloring polystyrene molding powder.

Bruhns Intressenter AB., Gastrikegatan 17, Stockholm, Sweden: white rubber surgical gloves with curved fingers.

John J. Carroll, Apartado 3135, Edificio San Francisco No. 3, San Francisco a Pajaritos No. 19, Caracas, Venezuela: electric wire and cable.

# CLASSIFIED ADVERTISEMENTS

*ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE*

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| *Allow nine words for keyed address.* | | *Letter replies forwarded without charge, but no packages or samples.* |

**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**

## SITUATIONS OPEN

**RUBBER CHEMIST**
**WEST COAST**

**Northern California plant requires heavily experienced rubber chemist familiar with production and compounding. B.S. required. Good opportunity in product development work. Address letter with education, experience, and salary requirements to:**

**Box No. 1431, c/o INDIA RUBBER WORLD**

LATEX SALES REPRESENTATIVE: ESTABLISHED EASTERN manufacturer requires aggressive salesman, preferably with latex compounding experience, to contact textile, carpet, and paper industries in Southeast. Car and travel expenses furnished. Excellent earnings possible. Application with complete résumé confidential. Address Box No. 1439, care of INDIA RUBBER WORLD.

**RUBBER LABORATORY ASSISTANT (MALE OR FEMALE) with high school education or better; experienced operator of laboratory rubber mixing mill, molding of rubber parts; rubber-to-metal bonding experience favored, but not essential. Good salary, moving expenses plus pension and bonus plan. Location between Hartford and Providence. Send details of education and experience. Replies will be kept in strict confidence. Address Box No. 1440, care of India RUBBER WORLD.**

**TECHNICAL SECRETARY FOR A CONNECTICUT RUBBER laboratory near State University. Good opportunity for a girl with a good education, experienced in rubber technology, and mathematically inclined. Address Box No. 1441, care of India RUBBER WORLD.**

**RUBBER CHEMIST, EXPERIENCED IN PHYSICAL TESTING and rubber compounding of precision mechanical molded parts. Up-to-date knowledge of rubber to metal, silicone, Buna N, neoprene to various specifications important. Top-flight man wanted by a Connecticut mechanical rubber products manufacturer. Real opportunity. Send résumé in confidence. Address Box No. 1442, care of India RUBBER WORLD.**

WANTED: MAN FOR WIRE INSULATING PLANT. APPLICANT must be capable of assuming complete charge of manufacturing and supervisory functions. Replies will be held in strictest confidence. Address Box No. 1443, care of INDIA RUBBER WORLD.

## SITUATIONS WANTED

**PURCHASING SPECIALIST FOR RUBBER COMPANY**

**Graduate of textile institute. Heavy experience purchasing all types and constructions of cotton, silk, and synthetic fabrics, rubber chems., and M.R.O. supplies. Technical background. Familiar with application of rubber, synthetic rubber, and resins to fabrics. Can guarantee substantial fabric inventory savings alone and prove invaluable in adopting suitable fabrics to meet specifications and sales requirements. Thoroughly familiar with inventory control in all phases of purchasing procedure. Can adapt to your requirements. Married; personable; age 36. Only interested in permanent career with reliable concern. Address Box No. 1432, care of India RUBBER WORLD.**

CHEMICAL ENGINEER: WITH RUBBER, PLASTIC, AND LATEX experience, desires responsible position with aggressive organization. Competent in all phases of compounding, research, development, design, quality control, production, and plant management. Expert knowledge of colloid field. Excellent record and references. Address Box No. 1433, care of INDIA RUBBER WORLD.

**WANTED: POSITION AS FACTORY SUPERINTENDENT OR developing engineer. Have had 20 years' experience in developing new equipment for labor-saving devices and have originated new articles made of rubber. My experience consists of the following lines: rubber tiling, molded goods of all description, open heat cures, plaster-cast mold construction, rubber rolls for the paper industry, and many other articles. Have been granted several patents on the above-mentioned materials, if you want the know-how. Address Box No. 1434, care of India RUBBER WORLD.**

RUBBER TECHNICIAN, DESIRES TO RELOCATE. OVER twenty years' experience in the wire and cable industry. Experience includes development and compounding, rubber and plastic extruding, laboratory control, factory control. Can handle people, laboratory and factory coordination. Reliable and steady. Address Box No. 1435, care of INDIA RUBBER WORLD.

OPPORTUNITY DESIRED. EXPERIENCED IN SMALL BUSINESS management, sales, and broad technical work. Specialized in large- and small-plant product development, production problems, etc., primarily rubber field. Age 39. Prefer warm climate; foreign considered. Address Box No. 1436, care of INDIA RUBBER WORLD.

SUPERVISOR, TWENTY YEARS' TECHNICAL AND PRACTICAL experience in rubber and plastic industry, in many types of rubberizing and proofing with natural and synthetic rubbers; also heavy and light gage films with embossing and printing. Capable of formulating compounds for both types of products. Address Box No. 1437, care of INDIA RUBBER WORLD.

PLANT, PRODUCTION MANAGER, 15 YEARS' EXPERIENCE IN all phases of rubber and plastics manufacturing. Industrial engineering background. Age 35. Relocate; salary secondary to challenging opportunity. Address Box No. 1448, care of INDIA RUBBER WORLD.

## SITUATIONS WANTED (Continued)

**COATING, LAMINATING, EXTRUSION, IMPREGNATION, gravure printing, foil rolling, vacuum metal evaporation and refining. Rubber, plastics, thermosets, and latex. Aluminum, papers, films, textiles. Classified defense and commercial. Extreme temperature conditions. At present chemical director, AaA-1 multi-plant company which operates in all these fields. Wish to change. Available for two days per week on permanent basis. Development, production, or marketing. Individual problem, or general supervision or special conditions. Address Box No. 1438, care of India RUBBER WORLD.**

## MACHINERY & SUPPLIES FOR SALE

BAKER PERKINS #14 JEM VACUUM MIXER, 50-GAL. WORKing cap, double-arm, sigma blade, jacketed shell. Kux model 25 Rotary Pellet Presses, 21 and 25 punch. Stokes Rotary Pellet Presses model RD-3 (16 punch) and model RDS-3 (15 punch). Ball & Jewell #1½ stainless-steel rotary cutter. Mikro Pulverizers #1-SH, #1-SI, #2-TH, and #2-SI. Large stock steel and stainless-steel tanks and kettles. PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

FOR SALE: FARREL 16" X 48" AND 15" X 36", 2-ROLL RUBBER mills, and other sizes up to 84". Also new and used lab. 6" x 12" & 6" x 16" mixing mills and calenders. Six American Tool 300-gallon Churns. Extruders 1" to 6". Baker-Perkins Jacketed Mixers 100, 50, and 9 gals., heavy-duty double arm. 350-ton upstroke Hydr. Press 22" x 24" platens. 325-ton upstroke 42" x 24" platens. Brunswick 200-ton 21" x 21" platens. Large stock of hydraulic presses from 12" x 12" to 48" x 48" platens from 50 to 2,000 tons. Hydraulic Pumps and Accumulators. Rotary Cutters. Stokes Automatic Molding Presses. Single Punch & Rotary Preform Machines. Banbury Mixers, Crushers, Churns, Rubber Bale Cutters, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 107 — 8th St., Brooklyn 15, N. Y. STerling 8-1944.

PICKER X-RAY, COMPLETE WITH NECESSARY LEAD INSULation, 110 Volts, Style 752, Serial 303, three Belts. Write P. O. Box 8, Hagerstown, Md.

FOR SALE: 1 10" X 20" TWO-ROLL RUBBER MILL, MD. 1 6' X 12' vulcanizer, quick-opening door, 1 Farrel 18" x 48" two-roll mill, M.D. Also calenders, hydraulic presses, extruders, etc. Chemical & Process Machinery Corp., 148 Grand Street, New York 13, N.Y.

BANBURY BODIES REBUILT. COMPLETE SERVICE, LONG experience, precision workmanship. Spare parts for all sizes, and we can fabricate any part required. Expert inspection of your installation in your plant on request. Write for estimates. INTERSTATE WELDING SERVICE, Offices, Metropolitan Bldg., Akron 8, Ohio.

**INDUSTRIAL STEEL CONTAINERS**

**800 — USED**

**10 gal. galv. riveted shipping containers, 33" high by 24" dia. with water-tight rubber gasket sealed removable lid. Jaybolt fastened, weight 127#. Can be used for transportation of chemicals, paints, solvents, metal parts. They are galv., painted alum., inside and outside. In excellent condition. Orig. cost—$40.00 ea. Our price—$10.00. F.O.B. Philadelphia.**

**DALTON SUPPLY CO.**

**2829 Cedar Street** **Philadelphia, Pa.**

**GOOD USED MACHINERY**

**WANTED YOUR IDLE EQUIPMENT**

**1—F. B. 24" x 84" Mill, w.c. bearings, reduction drive & 240 H.P., A.C., motor.**
**1—F. B. 32" x 92" inverted-L 4-roll Calender, reduction drive, D.C. varispeed motor.**
**1—Royle #4 Extruder, motor driven.**
**1—F. B. 6" x 13" self-contained 3-roll Calender, m.d.**
**1—6" x 12" Laboratory Mill, m.d.**
**2—Ball & Jewell #2 Rotary Cutters; 1—#1; 1, with 3 h.p. motor.**
**3—#28 Devine Vac. Shelf Dryers, 19-59" x 78" shelves, complete.**
**Also other sizes Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters.**

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**Consolidated Products Company, Inc.**

**64 Bloomfield St., Hoboken, N. J.**
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**Cable Address: Equipment Hoboken, N.J.**
***"Our 37th Year"***

# U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

## Exports of Domestic Merchandise

| | September, 1953 | |
|---|---|---|
| | Quantity | Value |
| UNMANUFACTURED, LBS. | | |
| Chicle and chewing gum bases | 405,734 | $150,057 |
| Balata, gutta percha, etc. | 1,500 | 3,810 |
| Synthetic rubbers | | |
| GR-S type | 1,572,302 | 400,247 |
| Neoprene | 2,385,648 | 1,049,742 |
| Nitrile type | 1,022,268 | 529,422 |
| Other | 47,315 | 40,697 |
| Reclaimed rubber | 2,002,177 | 180,877 |
| Scrap rubber | 2,240,694 | 80,890 |
| TOTALS | 9,677,638 | $2,435,742 |
| MANUFACTURED | | |
| Rubber cement ... *gals.* | 60,680 | $117,581 |
| And rubberized fabric ... *sq. yds.* | 235,805 | 205,132 |
| Clothing | ...... | 138,183 |
| Footwear | | |
| Boots and shoes ... *prs.* | 12,483 | 33,339 |
| Rubber-soled canvas shoes ... *prs.* | 13,441 | 27,979 |
| Heels ... *doz. prs.* | 72,537 | 74,230 |
| Soles, soling, top-lift sheets ... *lbs.* | 861,096 | 245,438 |
| Gloves and mittens ... *doz. prs.* | 17,669 | 68,185 |
| Drug sundries | ...... | 252,485 |
| Toys, balls, novelties | ...... | 105,709 |
| Hard rubber goods | | |
| Battery boxes ... *no.* | 21,101 | 41,468 |
| Other electrical goods ... *lbs.* | 142,635 | 97,274 |
| Other | ...... | 24,518 |
| Rubber tires and casings | | |
| Truck and bus ... *no.* | 65,548 | 2,858,803 |
| Auto and motorcycle ... *no.* | 92,768 | 1,096,989 |
| Aircraft ... *no.* | 2,049 | 135,749 |
| Off-the-road ... *no.* | 12,454 | 1,182,194 |
| Farm tractor ... *no.* | 5,587 | 238,842 |
| Implement ... *no.* | 1,151 | 33,236 |
| Other ... *no.* | 9,187 | 33,577 |
| Inner tubes | | |
| Auto ... *no.* | 53,540 | 84,300 |
| Truck and bus ... *no.* | 45,269 | 187,606 |
| Aircraft ... *no.* | 927 | 9,136 |
| Other ... *no.* | 17,557 | 34,805 |
| Solid tires | | |
| Truck and commercial ... *lbs.* | 1,404 | 30,546 |
| Tire repair material | | |
| Camelback ... *lbs.* | 732,581 | 209,549 |
| Other ... *lbs.* | 313,655 | 310,477 |
| Tape, except medical and friction ... *lbs.* | 89,588 | 58,550 |
| Belting | | |
| V-type, auto, fan ... *lbs.* | 84,897 | 128,004 |
| Transmission | | |
| V-type ... *lbs.* | 69,995 | 143,524 |
| Flat belts ... *lbs.* | 27,188 | 38,305 |
| Conveyor and elevator ... *lbs.* | 70,169 | 67,096 |
| Other ... *lbs.* | 5,787 | 4,345 |
| Hose | | |
| Molded and braided ... *lbs.* | 295,699 | 261,304 |
| Wrapped and hand built ... *lbs.* | 96,101 | 84,944 |
| Other hose and tubing ... *lbs.* | 97,867 | 102,387 |
| Packing | | |
| Sheet type ... *lbs.* | 35,258 | 22,970 |
| Other ... *lbs.* | 133,982 | 210,642 |
| Tiling and flooring ... *lbs.* | 153,813 | 47,774 |
| Mats and matting ... *lbs.* | 433,673 | 140,404 |
| Thread | | |
| Bare ... *lbs.* | 23,964 | 41,093 |
| Textile covered ... *lbs.* | 25,135 | 74,582 |
| Compounded rubber for further manufacture ... *lbs.* | 821,506 | 315,770 |
| Other rubber manufactures | ...... | 544,844 |
| TOTALS | ...... | $10,163,868 |
| GRAND TOTALS, ALL RUBBER EXPORTS | ...... | $12,609,610 |

## Reexports of Foreign Merchandise

| | | |
|---|---|---|
| UNMANUFACTURED, LBS. | | |
| Crude rubber | 1,769,049 | $453,133 |
| Scrap rubber | 20,064 | 8,627 |
| TOTALS | 1,789,113 | $461,760 |
| MANUFACTURED | | |
| Rubber toys, balls, novelties | ...... | $810 |
| GRAND TOTALS, ALL RUBBER REEXPORTS | ...... | $462,570 |

SOURCE: Bureau of the Census, United States Department of Commerce, Washington, D. C.

## Imports for Consumption of Crude and Manufactured Rubber

| | September, 1953 | |
|---|---|---|
| | Quantity | Value |
| MANUFACTURED | | |
| Rubber tires | | |
| Auto, etc. ... *no.* | 5,075 | $202,294 |
| Bicycle ... *no.* | 10,764 | 8,995 |
| Inner tubes | | |
| Auto, etc. ... *no.* | 315 | 2,942 |
| Footwear | | |
| Boots ... *prs.* | 22,447 | 60,288 |
| Shoes and overshoes ... *prs.* | 25,320 | 10,004 |
| Rubber-soled canvas shoes ... *prs.* | 14,212 | 13,967 |
| Athletic balls | | |
| Golf ... *no.* | 18,720 | 4,673 |
| Tennis ... *no.* | 20,184 | 5,909 |
| Other ... *no.* | 4,320 | 227 |
| Toys | ...... | 28,653 |
| Hard rubber goods | | |
| Combs ... *no.* | 21,888 | 2,304 |
| Drug sundries | ...... | 318 |
| Other | ...... | 3,432 |
| Rubberized printing blankets ... *lbs.* | 758 | 1,713 |
| Rubber and cotton packing ... *lbs.* | 3,846 | 6,996 |
| Gasket and valve packing | ...... | 4,503 |
| Molded insulators | ...... | 8,314 |
| Belting ... *lbs.* | 8,105 | 7,418 |
| Hose and tubing | ...... | 8,696 |
| Gloves ... *prs.* | 72,096 | 20,832 |
| Nipples and pacifiers ... *gr.* | 900 | 1,166 |
| Instruments ... *doz.* | 3,801 | 8,424 |
| Soles and heels ... *lbs.* | 15,593 | 13,473 |
| Bands ... *lbs.* | 790 | 321 |
| Other | ...... | 850 |
| Gutta percha manufactures ... *lbs.* | 5,055 | 5,232 |
| Synthetic rubber products | ...... | 8,926 |
| Other soft rubber goods | ...... | 142,170 |
| TOTALS | ...... | $583,040 |

| | September, 1953 | |
|---|---|---|
| | Quantity | Value |
| UNMANUFACTURED, LBS. | | |
| Crude rubber | 117,595,049 | $23,968,865 |
| Latex | 13,724,814 | 3,405,762 |
| Balata | 299,076 | 59,783 |
| Jelutong or Pontianak | 174,064 | 105,542 |
| Gutta percha | 47,251 | 41,681 |
| Crude chicle | 13,100 | 4,782 |
| Synthetic rubber | 2,392,079 | 648,549 |
| Reclaimed rubber | 244,000 | 8,426 |
| Scrap rubber | 3,122,436 | 135,998 |
| TOTALS | 137,611,869 | $28,379,388 |
| GRAND TOTALS, ALL RUBBER IMPORTS | ...... | $28,962,428 |

# Compounding Ingredients— Price Changes and Additions

### Accelerator-Activators, Organic

| | | | |
|---|---|---|---|
| Groco 30 | *lb.* | $0.095 / | $0.13 |
| 35 | *lb.* | .10 / | .135 |
| 53 | *lb.* | .135 / | .1525 |
| 54 | *lb.* | .14 / | .1575 |
| 55 | *lb.* | .1625/ | .18 |
| Hydrogenated stearic acid | *lb.* | .1075/ | .125 |

### Accelerator-Activators, Inorganic

| | | | |
|---|---|---|---|
| Litharge, Eagle | *lb.* | .15 / | .151 |
| Red lead, Eagle | *lb.* | .16 | |

### Plasticizers and Softeners

| | | | |
|---|---|---|---|
| Harflex 500 | *lb.* | .315 / | .345 |

# Estimated Pneumatic Casings, Tubes, Camelback Shipments, Production, Inventory, November-October, 1953— First 11 Months, 1953, 1952

| | Original Equipment | Replacement | Export | Total | Production | Inventory |
|---|---|---|---|---|---|---|
| Passenger Casings | | | | | | |
| November, 1953 | 1,875,109 | 2,184,584 | 74,641 | 4,134,334 | 5,531,385 | 12,283,698 |
| Change from previous month | | | | −32.61% | −15.28% | +12.27% |
| October, 1953 | 2,832,129 | 3,212,467 | 90,223 | 6,134,819 | 6,529,241 | 10,941,065 |
| 1st 11 mos., 1953 | 30,842,641 | 43,458,665 | 732,550 | 75,033,856 | 76,048,857 | 12,283,698 |
| 1952 | 21,659,994 | 43,018,808 | 658,510 | 65,337,312 | 67,842,649 | 9,612,240 |
| Truck & Bus Casings | | | | | | |
| November, 1953 | 345,924 | 544,737 | 60,345 | 951,006 | 1,034,469 | 2,567,516 |
| Change from previous month | | | | −33.88% | −8.88% | +2.48% |
| October, 1953 | 322,720 | 1,033,500 | 82,161 | 1,438,381 | 1,135,226 | 2,505,363 |
| 1st 11 mos., 1953 | 4,486,310 | 8,762,825 | 667,073 | 13,916,208 | 13,620,624 | 2,567,516 |
| 1952 | 4,907,741 | 8,162,497 | 724,287 | 13,794,525 | 14,648,546 | 2,659,464 |
| Total Automotive Casings | | | | | | |
| November, 1953 | 2,221,033 | 2,729,321 | 134,986 | 5,085,340 | 6,565,854 | 14,851,214 |
| Change from previous month | | | | −32.85% | −14.33% | +10.45% |
| October, 1953 | 3,154,849 | 4,245,967 | 172,384 | 7,573,200 | 7,664,467 | 13,446,428 |
| 1st 11 mos., 1953 | 35,328,951 | 52,221,490 | 1,399,623 | 88,950,064 | 89,669,481 | 14,851,214 |
| 1952 | 26,567,735 | 51,181,305 | 1,382,797 | 79,131,837 | 82,491,195 | 12,271,704 |
| Tractor—Implement Casings | | | | | | |
| November, 1953 | 97,918 | 53,906 | 4,339 | 156,163 | 184,535 | 828,596 |
| Change from previous month | | | | −28.79% | −21.73% | +3.67% |
| October, 1953 | 104,244 | 109,088 | 5,957 | 219,289 | 235,752 | 799,247 |
| 1st 11 mos., 1953 | 2,259,744 | 1,303,273 | 61,315 | 3,624,332 | 3,559,712 | 828,596 |
| 1952 | 2,510,217 | 1,241,656 | 98,263 | 3,850,136 | 3,942,467 | 783,077 |
| Passenger, Motorcycle, Truck and Bus Inner Tubes | | | | | | |
| November, 1953 | 2,222,050 | 1,707,942 | 75,699 | 4,005,691 | 4,737,880 | 11,606,918 |
| Change from previous month | | | | −32.79% | −17.64% | +6.44% |
| October, 1953 | 3,156,385 | 2,696,350 | 107,271 | 5,960,006 | 5,752,422 | 10,904,188 |
| 1st 11 mos., 1953 | 35,351,943 | 34,193,043 | 795,032 | 70,340,018 | 69,981,979 | 11,606,918 |
| 1952 | 26,541,153 | 31,088,585 | 956,022 | 58,585,760 | 59,431,599 | 10,909,946 |
| Camelback (Lbs.) | | | | | | |
| November, 1953 | — | 26,509,876 | 676,503 | 27,186,379 | 26,628,205 | 26,983,021 |
| Change from previous month | — | | | −13.31% | −2.93% | −0.64% |
| October, 1953 | — | 30,177,268 | 1,184,000 | 31,361,268 | 27,430,735 | 27,156,048 |
| 1st 11 mos., 1953 | — | 250,445,732 | 7,654,718 | 258,100,450 | 256,419,078 | 26,983,021 |
| 1952 | — | 229,877,760 | 5,125,120 | 235,002,880 | 233,880,640 | 21,436,800 |

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

# CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY AND SUPPLIES FOR SALE (Continued)

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Farrel Mixing Mill

Motor Drive, 15 x 36

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WANTED BY PRIVATE PARTY: 1 3A BANBURY 1-66″ CALENDER. Please indicate price in offering. Address Box No. 1445, care of INDIA RUBBER WORLD.

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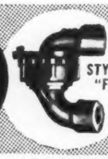


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